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ABSTRACT

Following research that documented inadequate motivation as a problem through assessment of academic performance, student motivational surveys, teacher class records, and teacher journal entries, a program was conducted to increase the level of motivation of junior high school students in a middle-class community in central Illinois. Observations at the sites and a review of literature suggested probable causes for low motivation: low socioeconomic status, inappropriate parental supervision, peer pressure to underachieve, lack of transfer of class content, and lack of opportunity for students to help make decisions in the classrooms. Review of instructional strategies suggested an inadequate variety of lesson delivery and assessment. Three major categories of intervention were tried: use of learning activities that foster student awareness that knowledge and skills are transferable outside the classroom; increasing students' choices in assessment areas and learning activities; and students employing multiple intelligences strategies. Learning activities were taken from industrial arts topics, including measurement, technical drawing, woodworking, research and design, and small engines. Analysis of data indicated that the intervention had little or no impact on student motivation levels. Although teacher observations indicated that students exhibited more time on task with greater involvement in learning tasks, these motivation level changes could not be documented using the Motivated Strategies for Learning Questionnaire. (The report's 17 appendixes provide project material, such as journal entries and lesson plans. Contains 29 references.) (Author/KC)

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ED 410 423

IMPROVING ADOLESCENTS' MOTIVATION THROUGH THE USE OF CREATIVE TEACHING IN THE INDUSTRIAL ARTS

Steven Jans

An Action Research Project Submitted to the Graduate Faculty of the School of Education in Partial Fulfillment of the Requirements for the Degree of Master of Arts in Teaching and Leadership

Saint Xavier University & IRI/Skylight
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ABSTRACT

This report describes a program for advancing levels of motivation in order to increase academic growth. The targeted population consists of junior high school students in a growing middle class community located in central Illinois. The problem of inadequate levels of motivation will be documented through assessments that indicate student academic performance, student motivational surveys, teacher class records and teacher journal entries.

Probable cause data was gleaned from observations at the sites and from a review of professional literature. Those probable causes included low socio-economic status, inappropriate parental supervision, peer pressure to underachieve, lack of transfer of class content, and lack of student opportunity to help make decision in the classroom. Review of instructional strategies revealed an inadequate variety in lesson delivery and assessment.

A review of solution strategies suggested by experts in the field, combined with an analysis of the problem setting, resulted in the selection of three major categories of intervention: utilization of learning activities which foster student awareness that knowledge and skills are transferable outside the classroom; increasing students choices in assessment areas and learning activities; and students employing multiple intelligences strategies.

The analysis of postintervention data indicated that the intervention had little or no impact on student motivation levels. Although teacher observations indicated that students exhibited more time on task with greater involvement in learning tasks, these motivation level changes could not be documented using the MSLQ. Students' perceptions of task value, control beliefs and self efficacy were seen as having a direct impact on student intrinsic motivation levels.

CHAPTER 1

PROBLEM STATEMENT AND CONTEXT

General Statement of the Problem

The targeted junior high school students exhibit inadequate levels of motivation that interfere with academic growth. Evidence for the existence of the problem includes assessments that indicate student academic performance, student motivational surveys, teacher class records and teacher journal entries.

Immediate Problem Context

School Site A

The targeted junior high school consists of 7th and 8th grades. It is part of a large Midwestern elementary (pre-kindergarten through 8th grade) school district with a total student population of 4,116. The district houses the students in 10 buildings, consisting of 6 elementary schools (pre-kindergarten through 3rd grade), 2 intermediate schools (4th through 6th grades), and 2 junior high schools (7th and 8th grades). As reported in the School Report Card, the district has an annual operating budget of $19,000,000 with an expenditure per pupil of $4,222. The total student population of the junior high is 451, with a racial composite of 97.8% Caucasian, 0.7% Black, 0.4% Hispanic, and 1.1% Asian, with no limited English-proficient students. The school population is comprised of middle and low income students with approximately 31% of the student population classified as low income. Pupil attendance and mobility rates are within one percentage point of the state average at 95% and 15% respectively.

The student schedule consists of five periods daily with four core subject areas: English, mathematics, social studies, and science, and one period of exploratory/physical education activities. The exploratory area consists of a combination of 12 weeks of art/physical education, 12 weeks of music/physical education, and 12 weeks of either industrial arts or home economics/physical education which rotate between the junior high schools on a yearly basis. The average class size is 30 students. The core subject class periods are 60 minutes long, with exploratory and physical education sharing one period every other day.

The teaching staff consists of 28 full time teachers, with 7 male and 21 female teachers. The teacher-student ratio is 19:1 and the staff is 100% white. The faculty of the elementary district averages 15.9 years teaching experience with, 33% having completed master's degrees or above. The average salary is $32,940 for teachers and $58,225 for administrators. The teaching staff is supported by two administrators (a principal and a vice principal), a part-time counselor, and two full-time learning center teachers.

This school building was built in 1953 and is designed with a single level school building floor plan. The school has adopted the middle school philosophy, and is an active participating member of AIMS. The student and staff populations are broken down into four "houses" or teams which consist of two 7th grade teams and two 8th grade teams. Each team is responsible for approximately 115 students. The team consists of a social studies, math, science, English, and special education teacher

with a special education aide. This approach gives the teachers the ability and flexibility to team teach, plan interdisciplinary units, take field trips, and includes a 60-minute individual/team plan period each day. Each team acts as a school within a school that has its own shared decision-making policies, budget, equipment, and agenda, and therefore, allows the teachers to have greater autonomy and personal interaction with the students and their parents.

The junior high curriculum is supported with a full service media center which includes an Apple computer lab with 28 Apple II computers, a networked IBM 286 Lab with 33 computers and a 19-station networked Apple Macintosh multi-media lab, plus individual stand-alone units for in-classroom work. The building has four areas that have access to the Internet. In the summer of 1996, all classrooms, district offices, the local city library, and various educational partners will be wired for a local and wide area network with access to the Inter-net and World Wide Web.

This junior high also offers students an array of extra curricular activities including two boys' basketball teams, a girls' basketball team, boys' and girls' track, cheerleading, and pom pons. Other extra curricular areas include Art Club, Choir, Technology Club, Scholarship Bowl, Math Counts, Student Council, Speech Club, Chess Club, Young Authors Club, Band, Marching Band, and Orchestra.

Community Description

School Site A is located in the Midwest, in a mid-size city of approximately 35,000 people. The city was founded in 1824, and is the county seat for a population of 120,000 people. Though the

city is relatively large in Midwestern standards, it does not have the capability of being self-supporting. It relies heavily on its close proximity to a major Midwestern city for a large part of its employment opportunities. The tri-county metropolitan service area has a population of over 355,000. The city could be classified as having a predominantly mixed blue and gray collar population with a median family income of approximately $25,000.

As stated in a brochure about this area, among employed persons 16 years of age and over, approximately 45% work in managerial or professional fields; 20% as operators, fabricators, or laborers; 23% in service occupations; 2% in farming, forestry, or fishing occupations; and the remaining 10% are in technical, sales and administrative support or in precision productions, craft and repair.

The median home value in the city is $42,000 with an average of 2.43 persons per household. Age demographics show this community to be somewhat stratified with 26% of its citizens to be 18 years or younger and 16% over the age of 65. The median age of males in this city is 34.7 years. The city has approximately the same ethnic background as the schools' student population with a 98% Caucasian makeup.

The community offers many amenities to its citizens including an extensive park and recreation system, a library, a congressional research center, an 80-bed hospital, and many civic, fraternal and religious organizations.

National Context of the Problem

The lack of motivation or the possession of motivation is something about which many have speculated for hundreds of years. Modern theories of motivation have their origin in our early intellectual history. Greek philosophers, including Socrates and Plato, decided that right knowing leads to right acting. Plato believed that to get people to behave properly we should make sure that they receive care and instruction from the finest people. Plato was expressing the fact that our minds causally determine our behavior. In today's world, cognitive theories of motivation are major and dynamic areas of theoretical and research activity (Ball, 1982).

Motivation is an "umbrella" term that has a wide variety of meanings. Teachers see motivation as a characteristic that helps students succeed; the "lazy" student, who is seen by the teachers as not working up to his or her potential, is said to be unmotivated. Psychologists and researchers define motivation as the processes involved in arousing, directing, and sustaining of behavior (Ball, 1982). Classroom teachers define motivation as the characteristic that makes good students learn and achieve.

Researchers have identified different kinds of goals that motivate students in school settings. Maehr's study (as cited in Winograd and Gaskins, 1992) described these goals:

> Ego goals are satisfied by success in competition, where one person outperforms another and there are clear winners and losers. For example, ego goals are involved when students compete to see who can obtain the highest score on a test. Extrinsic goals are achieved by obtaining symbolic rewards.

> Working to get an "A" in a subject is a common example of extrinsic goals. Intrinsic goals are fulfilled by the satisfaction involved in the task itself. . . . Finally, social goals are realized through the development of relationships with significant others, including friends, teachers, and parents. Social goals develop a sense of community, a sense of approval, and a sense of belonging. (p. 227)

The problem of lack of motivation reaches across the curriculum from preschool to high school years. School children's motivation decreases as their years in school increase. Belmont and Skinner's study (as cited in Astuto & Clark, 1994) found that across the preschool to high school years, children's intrinsic motivation decreases, and they feel increasingly alienated from learning. Motivated students are easy to recognize and encourage, but are difficult to find (Bracey, 1994).

The unmotivated student is in jeopardy of becoming a student at risk. As cited in Collopy and Green (1995), both Maehr and Midgley (1991) and Maehr and Pintrich (1991), have tested a theory of student motivation known as achievement goal theory and confirmed what other studies had indicated: The goals that students set for themselves have a powerful influence on the quality of their learning and level of motivation. (p. 37)

McMillan and Reed (1994) found that students who set goals tend to have an "internal locus of control." If people think their successes are caused by ability, then feelings of confidence are experienced. Some of the qualities exhibited by motivated students are positive attitudes, respect for others, preparedness

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for class, volunteering, high intrinsic motivation and optimism about the future.

Teacher behaviors also have been suggested as ways to improve student motivation. McMillan and Reed (1994) cite the following interpersonal qualities of a teacher as important in the success of students: being caring, having respect for them as persons and as learners, being able to get along with them, listening without being intrusive, taking them seriously, being available and understanding, helping and providing encouragement, and laughing with them. Professional behavior and competence are also important according to McMillan and Reed. In reference to teacher preparation and disposition, school environment and teacher training must be developed to promote a sense of internal locus of control, optimism and a sense of personal responsibility. Attempts to increase these qualities have met with limited success, possibly due to school systems that do not allow students to become involved in the planning of their academic lives.

Motivation has been a concern of educators, philosophers, and researchers for centuries. The term itself is somewhat ambiguous and is interpreted in different ways by different academic disciplines. Educators remain concerned about students' inadequate levels of motivation such as indifference, being off task and a lack of serious approach to studies as exhibited in the classroom and observed by teachers. Therefore, this paper will be addressing means by which student motivation may be increased.

CHAPTER 2

PROBLEM DOCUMENTATION

Problem Evidence

In order to document the existence of inadequate levels of motivation in the targeted junior high school students, research revealed that the Motivated Strategies for Learning Questionnaire (MSLQ) would be an appropriate assessment tool to use. The MSLQ is a self-report instrument designed to assess motivational orientations of students and is based upon a general cognitive view of motivation. (See Pintrich, Smith, Garcia & McKeachie, 1991 for a description of the instrument).

The MSLQ is being used as a research instrument to ascertain the levels of student motivation and any changes in motivation levels produced by the implementation of the intervention plan.

The motivation section of the MSLQ consists of 31 items that assess students' value beliefs for the course, their beliefs about their skills to succeed at the tasks and their anxiety levels about tests taken during the course. The instrument is designed to be given in the classroom setting and takes approximately 20 minutes to administer. The students rate themselves on a four point Likert-scale. The motivation scales are grouped into two general components, value and expectancies. The value component is comprised of questions that assess intrinsic motivation, extrinsic motivation, and task values. The expectancy component assesses students' control beliefs and sense of self-efficacy for learning and performance.

Of the 19 students in the affected class, 18 were involved in the intervention process over a 12 week time period. The students were given an adapted version of the MSLQ motivational questionnaire and the results are presented as both individual segments of the test and the general components of values, expectancies and test anxiety. The results were analyzed by grouping student responses to the individual components and dividing this score by the total number of responses, to arrive at a percentage score that would represent the groups' orientations to that component.

The MSLQ motivational questionnaire includes value components, expectancy components and an affective component.

Value Components

The value component of student motivation involves students' goals for the class, their beliefs about the importance of class content and the interest and value the students place on the task they are asked to perform. The various value components include:

1. Intrinsic Goal Orientations - Intrinsic goal orientation concerns the degree to which the students perceive themselves to be participating in a task for reasons such as challenge, curiosity, or mastery. Having an intrinsic goal orientation towards an academic task indicates that the student's participation in the task is an end to itself, rather than participation being a means to an end.

2. Extrinsic Goal Orientation - Extrinsic goal orientation complements intrinsic goal orientation, and concerns the degree to which the students perceive themselves to be participating in a task for reasons such as grades, rewards and competition.

3. Task Value - Task value refers to students' perceptions of the course material in terms of interest, importance, and utility. Task value differs from goal orientation in that task value refers to the student's perception of how interesting, how important and how useful the task is. Goal orientation refers to the reasons "why" the student is participating in the task.

Table 1

Value Components: Number of Student Responses to MSLQ with Student Response Percentages

Component:	1 not true	2 more or less not true	3 more or less true	4 very true	total number of student responses
Intrinsic Goal Orientation Questions 1-4	14 (19%)	19 (26%)	23 (32%)	16 (22%)	72
Extrinsic Goal Orientation Questions 5-8	9 (12%)	13 (18%)	11 (15%)	39 (54%)	72
Task Value Questions 9-14	14 (13%)	31 (29%)	32 (30%)	31 (29%)	108

As the data in table 1 evinces, the results of the MSLQ questionnaire indicate that a high percentage, 69%, of the students surveyed report being extrinsically motivated by grades and external rewards. Only slightly more than one-half of the class report being motivated intrinsically by class content that

challenges and arouses their curiosity. This combination of high extrinsic and low intrinsic motivational levels suggests students engagement in the learning process is externally driven, and may prevent students from taking responsibility for their learning. Three-fifths of the students report that task value, the belief that course content has value and application outside of the classroom, could play an important role in determining their motivation levels. This information is illustrated in figure 1.

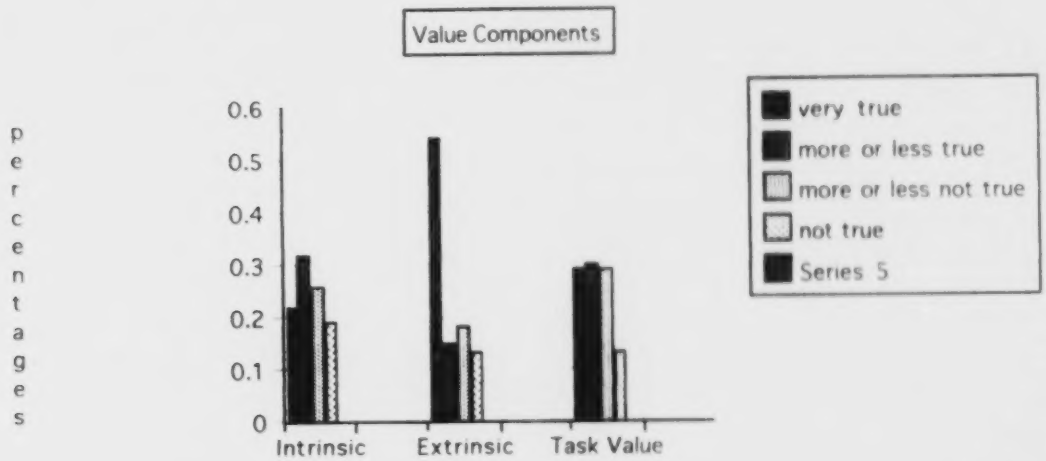

Figure 1. Value Components and student response percentages for the pre-intervention MSLQ survey.

Expectancy Components

1. Control of Learning Beliefs - Control of learning refers to students' beliefs that their efforts to learn will result in positive outcomes. It concerns the belief that results are contingent on one's own effort.

2. Self-Efficacy for Learning and Performance - This analyzes two aspects of expectancy: expectancy for success and

self-efficacy. Expectancy for success refers to the students' performance expectations and relates specifically to task performances. Self-efficacy is a self-appraisal of one's ability to master a task. Self-efficacy includes the students' judgments about their own ability to accomplish a task and confidence in their skills to perform that task.

Table 2

Expectancy Components: Number of Student Responses to MSLQ with Student Response Percentages.

Component:	1 not true	2 more or less not true	3 more or less true	4 very true	total number of student responses
Control Beliefs Questions 15-18	13 (18%)	9 (13%)	16 (22%)	34 (47%)	72
Self-Efficacy Questions 19-26	10 (7%)	22 (15%)	46 (32%)	66 (45%)	144

The survey results of the expectancy components, as illustrated in table and figure 2, indicate approximately one-third of the students do not believe that their effort to learn class material and their beliefs in their ability and confidence to learn class material will result in positive outcomes for them. This information is illustrated in figure 2.

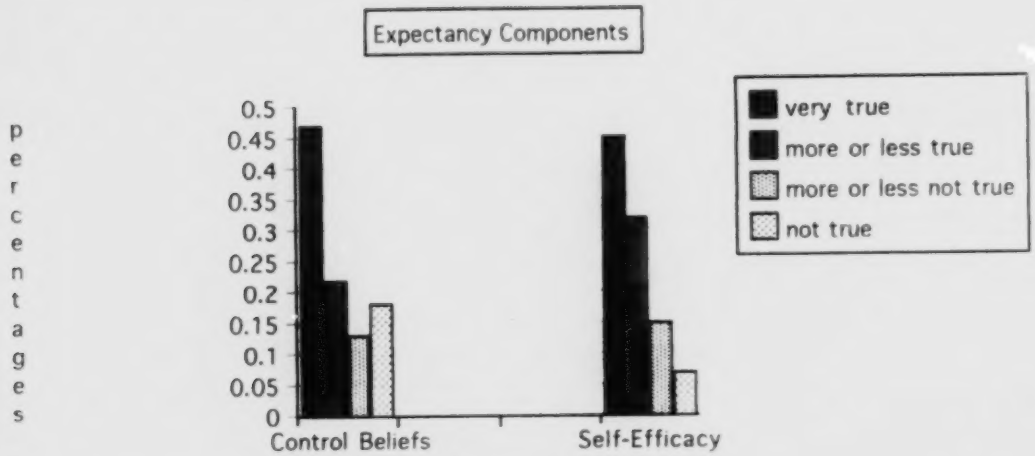

Figure 2. Expectancy Components and student response percentages to the pre-intervention MSLQ survey..

Affective Component: Test Anxiety

Test anxiety has been found to be negatively related to expectancies as well as academic performance. Test anxiety is thought to have two components: a worry component and an emotionality component. The worry component refers to students' negative thoughts that disrupt performance, while the emotionality component refers to affective and physiological arousal aspects of anxiety.

Table 3

Affective Components: Number and Type of Student Responses to MSLQ with Student Response Percentages.

Component:	1 not true	2 more or less not true	3 more or less true	4 very true	total number of student responses
Test Anxiety Questions 27-31	39 (43%)	11 (12%)	12 (15%)	28 (31%)	90

The results of the survey on test anxiety, table 3, demonstrate that approximately three-fifths of the students experience test anxiety at levels that could be perceived as having a negative impact on their ability to perform well. These anxiety levels can be assumed to have the same negative effects on the students control and self-efficacy beliefs. This information is illustrated in figure 3.

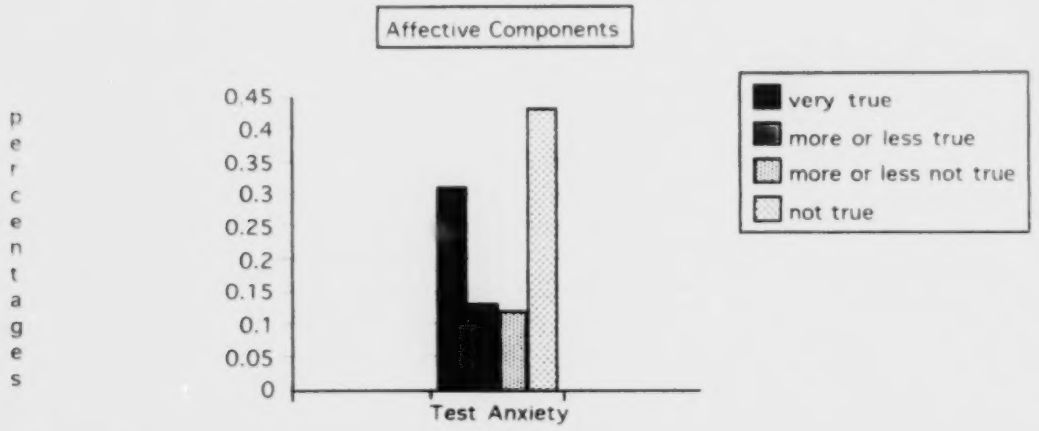

Figure 3. Affective Component and student response percentages of the pre-intervention MSLQ survey.

Probable Causes

Based on the information garnered from the school site, there are several underlying causes for the lack of motivation exhibited by students. The causes fall into three major categories: peer pressure to underachieve, negative decisions to gain control and the lack of perceived value or worth in what they are studying.

Students can be pressured into making poor decisions by their peers. Some students choose to underachieve in order to impress their friends or to fit in with a certain group of students. Teachers can observe this pressure students put on one another when they ridicule their peers for getting good grades or completing classroom tasks. The ridiculed student feels he or she must live down to the low standards set by their peers.

Teachers have also observed students who have made negative choices to gain control for themselves regarding their school work. These students have decided that they know they can fail, but do not have the self esteem to tell themselves they can succeed. Therefore, the students gain control over the only thing they know they can do and choose to fail rather than take the chance to succeed. These students feel that they don't have the knowledge or skills to perform well and have decided not to do the required class tasks, thus further fulfilling the expectations of themselves and their peers.

A large portion of the students from low socioeconomic backgrounds see very little value to their education. These students have trouble making the connection between class content and how it can have an impact on their future educational or career goals. Students sometimes complain and ask, why they need

to learn different concepts and when they are going to use what they learn. The students have difficulty seeing themselves using the acquired skills and knowledge in their future. This lack of knowledge about the transfer of skills can have a negative impact on their motivational levels.

The literature suggests several underlying causes for the lack of student motivation. According to Bacon (1993) students see little connection between school curriculum and the rest of their lives. When students do not make this transfer, they become bored and disengaged from classroom learning. His studies led him to conclude that students did not perceive school as being a place for learning. They did not feel that school was a challenge to them, nor did they see any chance of gaining enough control to make the work challenging.

Students are accustomed to the high-tech, "glitzy" presentations of television, video games, and movies, and teachers find it difficult to compete with this (Hootstein, 1994). Hootstein notes that teachers express concern about the quality and quantity of effort that students allot to academic tasks. He cites studies conducted by the National Center for Educational Statistics in which many students complain that school work is boring.

In addition, if students feel powerless in the classroom, they will not be motivated (The Master Teacher, 1987). Students' feelings of powerlessness and inadequacy can stem from something as simple as the inability to discern the teacher's expectations.

Without power, they may choose not to do work, therefore gaining negative control for themselves (Bacon, 1993). White,

Blythe, and Gardner (1992) express that instructors of traditional classrooms teach and assess through verbal-linguistic and logical-mathematical intelligences. Students who are not strong in these areas are at a disadvantage and may meet with failure. Constant failure leads to despair (Redick & Vail, 1991).

Steinberg, Brown, and Dornbusch (1996) states there seems to be a vicious cycle--students disengage from school, schools demand less from disengaged students, students disengage further when little is demanded of them, and so on. He asserts that disengaged students lose a psychological connection and may be exhibiting signs of having problems as adults. He acknowledges that schools do need to be more interesting, but he chastises students who have not accepted that they must be willing and able to be interested.

CHAPTER 3

THE SOLUTION STRATEGY

Literature Review

A variety of solutions were discovered through a review of professional literature. These range from regulating classroom climate, varying teaching strategies, and allowing the students to share in the decision-making process including making curricular adaptations in order to teach for transfer and incorporating the theory of multiple intelligences. These solutions will be further explained in the following paragraphs.

Research indicates that a positive classroom climate is an effective way to foster motivation. Redick and Vail (1991) suggest that the classroom climate should be pleasant and friendly but clearly focused on the learning task at hand. In order to keep learning focused, the Master Teacher Video Series (1987) encourages teachers to insist on respect for property and people, including the students themselves, in the classroom. In addition, the teacher should set high expectations to keep the students responsible, to compel them to work up to their ability and to become competent. This results in all student work being of value to the rest of the class. Ways to make the climate friendly include using students' first names, using caring phrases and recognizing friendships. Whenever possible, physical conditions in the room such as temperature, lighting, air flow and seating arrangements should be comfortable and regulated so as not to detract from the learning environment. By doing these things, the teacher will help make the classroom friendly and cooperative

where students feel welcome, wanted and secure.

Promoting a positive classroom climate is a way of personalizing education and fulfilling students' needs in an attempt to increase motivation. According to Glasser (1990), there are five basic needs: love, power, fun, freedom and survival. For workers and students to do quality work, they should be taught in a way that convinces them their needs are being fulfilled. Children are born motivated, not bored. They enter the world eager, reaching, looking, and touching. The hope is that students will continue to be motivated to discover (Rich, 1992). Therefore, the school needs to satisfy most of each student's basic needs by creating a positive learning and working environment (Glasser, 1990). According to Redick & Vail (1991), students need to work with their peers to feel that they belong and are accepted by others. A feeling of belonging and acceptance can be achieved by instituting cooperative learning strategies in the classroom. Information gleaned from Glasser's (1990) interviews with students supports the claim that students work harder as a team, because they are allowed to socialize and because they know that others are depending on them.

Another way to satisfy students' needs is to build in success and increase the degree to which pupils are psychologically connected to what is going on in their classes (Steinberg,et al. 1996). Brophy (1987) notes that the simplest way to ensure that students expect success is to make sure they achieve it consistently. This can be accomplished by teaching at the students' instructional levels. The teacher should always move in small steps by considering the amount of work the students are

given. The goal is for students to meet with success before moving on to the next level of difficulty or to the next step in the sequence (Redick & Vail, 1991). This allows the students to achieve success before reaching their level of frustration. The more success that is experienced by the students, the more optimistic they are about future tasks and performances (Hunter, 1994).

The success levels of students depend upon the degree to which the teacher prepares students for the task through guidance and feedback. This feedback should have value and be immediate to help guide subsequent responses (Brophy, 1987). Teachers should specifically let students know what they are doing well, what they need to improve upon, and how to improve their performance on the task (Hunter, 1994). The typical teacher feedback methods include returning graded and critiqued papers and projects as soon as possible, often adding personalized notes to the students. The use of rubrics and Likert scales is an excellent example of specific feedback. Brophy (1987) contends that verbal feedback by the teacher, while the task is being performed, provides students with their progress during seatwork. Students can be given the responsibility to monitor their own progress through methods such as self-correcting computerized learning programs and teacher-provided answer keys. Another approach to providing immediate and valuable feedback is to designate student helpers to serve as peer facilitators. Students can review their work in pairs or small groups. Corno (1992) recommends that students read their work aloud so that peer audiences can provide constructive feedback.

Another relevant concept for increasing motivation or engagement deals with goal setting. Goals have a powerful influence on the quality of student learning (Collopy and Green, 1995). Experimental studies have shown that teaching students to set goals for themselves enhances their sense of cognitive efficacy, their academic achievement, and their intrinsic interest in the subject matter (Zimmerman, 1992). Students need to be taught how to set and commit themselves to goals that are short-term, specific, and challenging (Brophy, 1987). In The One Minute Teacher, Johnson and Johnson (1986) promote brevity in the writing of goals. Their feeling is that students should write goals that could be reviewed in only one minute. After pupils set their goals, Ellison (1992) has them write and draw in their journals about imagined successes. This helps students visualize their goals and keeps these goals uppermost in their minds. Pupils then establish the steps necessary to achieve their goals. By setting these goals, students experience self-esteem, self-confidence, and greater orientation toward learning tasks (Winograd & Gaskins, 1992).

Steinberg, et al. (1996) suggests schools are limited in their effectiveness in changing student motivational behaviors. The roots of the achievement problem might reside outside of the schools. Parents and family, peers and outside jobs have an important effect in student success. Parents profoundly influence their children's achievement in school. Instead of undermining their children's commitment to achievement, parents need to communicate messages about the importance of school and learning.

Demonstration of support might involve such things as attending and volunteering at school functions, helping their child decide upon and register for classes and helping with homework completion. Even though it is true that parents play a central role in their child's educational development, Steinberg notes that friends take on great importance after students reach age 12. With each passing year, peers' influences grow stronger and may overshadow even the best family values. When students have a strong sense of identity and are secure in their decision making skills, they are less likely to be negatively influenced by peers. Other than parent and peer influence, Steinberg argues that students should not have an after-school job; but if they must, they should keep their work hours to less than 20 per week. Too many work hours significantly interfere with academic achievement and school commitment.

Intrinsic and extrinsic motivation may be driving forces in improving student engagement and school commitment. Students who are intrinsically motivated find internal satisfaction from doing an activity or task. Students who are extrinsically motivated perceive that academic achievement will lead to rewards they value (Hunter, 1994). Brophy (1987) contends that teachers should offer and deliver rewards in a way that emphasizes knowledge and skills rather than in a way that encourages students to focus just on the rewards. Hunter (1994) suggests that teachers who use extrinsic motivation should help ensure that students are concerned about the outcome, enjoy doing the task, meet with success, find the material related to everyday life, and show improvement in their performance. In this way, if the students enjoy the process,

their motivation will move from extrinsic rewards to intrinsic interests.

Another method to encourage motivation is the constructivist approach that looks not for what students can repeat, but for what they can generate, demonstrate and exhibit. The constructivist framework encourages students to focus on large ideas and gives them the power to follow their interests, to make connections, to reformulate ideas, and to reach unique conclusions (Brooks & Brooks, 1993). A similar method, resource-based learning, shifts responsibility and locus of control in the learning environment to the learner. This method still maintains the advantages of the teacher's content knowledge and expertise while allowing the learners to teach. This fosters genuine responsibility with accountability. In classrooms using this approach, students work in small groups and share knowledge, access information from peers, and work in a more thorough fashion because others are depending on them. This promotes a more active learning style (Shelley, 1992).

Students need to find their education useful in the 1990's and beyond. If students see the usefulness, they are more likely to be engaged in learning. Students need to be shown the relevance between school learning and their own lives outside the classroom (Hootstein, 1994). Brophy (1987) suggests the following teaching interventions to make abstract content more personal, concrete, and familiar:

> Promote personal identification with content by relating experiences or telling anecdotes illustrating how the content applies to the lives of individuals (especially persons whom

> the students are interested in and likely to identify with). Make abstractions concrete by showing objects or pictures or by conducting demonstrations. Help students relate new or strange content to their existing knowledge by using examples or analogies referring to familiar concepts, objects, or events. Where a text is too abstract or sketchy, elaborate by filling in sufficient detail to enable students to visualize what is being described and explain it in their own words. (p. 47)

Klein and Freitag (1992) provide a specific strategy for making instruction self-relevant. First, students should build on experiences by identifying the skills it takes to master the task and determining which of those skills they possess. They should also relate their likes, wants, and needs to what they are being taught. Second, students should find the present worth of the instructional task and how it could apply to their lives. Third, students should find future usefulness; that is, how will they use what they are learning now in a future application. Glasser (1990) agrees that transfer is crucial and that teachers need to do more explaining about why they teach the materials they do. Teachers should ask students if they agree that these materials are worth learning and if they are willing to learn them until they know them well. Rich (1992) contends that after transfer is realized, the students will be able to use and adapt the acquired skills and knowledge to situations in their present and future lives.

To improve motivation, students should be provided with opportunities that allow them to perceive a sense of control in

the classroom (Hootstein, 1994). This can be achieved by giving the students individual responsibilities within the classroom, such as allowing students to take attendance, set up equipment and run errands. Allowing students to draw on their own experiences and serve as authorities in areas in which they are experts gives students identity in the classroom and a sense of empowerment. Another way to allow students control in the classroom is to give them some choice in creating the curriculum. Giving them the choice of chapters to be covered, books to be read, and assignments to be completed are representative examples. Kallick (1992) reports when students are brought into a dialogue about standards, ownership of their work is more evident and evaluation is more successful. This can be achieved by involving the students in creating Likert scales and rubrics that set the standards for the task.

Hootstein (1994) contends teachers need to learn new strategies to enhance student motivation through instructional processes. Some of the strategies effective in motivating students are: having students role play characters in simulations, relating content to current events or students' lives, using thought-provoking questions, and providing small-scale hands-on experiences. Redick & Vail (1991) propose that teachers plan activities that include novel events, situations, and materials so students are more likely to be motivated to learn. Once teachers have captured the students' attentions, it is easier to keep the students involved. Students who are encouraged to develop their strengths are more likely to enjoy their work and to persevere when they encounter difficulties in

the classroom, resulting in increased motivation (White, Blythe, & Gardner, 1992).

Gardner introduced the theory of the multiple intelligences. Everyone possesses all seven intelligences but in varying degrees of strengths. Students may have strengths in areas of intelligence that traditional classrooms do not tap. Educational standards do not have to be lowered for those students, but should be expanded to offer a wider variety of opportunities for success. This can be accomplished by making students aware of the seven intelligences and identifying individual strengths.

Teachers can help students learn by utilizing their own strengths and working to enhance the areas that are less developed. Also, teachers need to incorporate the seven intelligences into daily lessons. To illustrate, Nelson (1995) employs an eight-day unit using the multiple intelligences. Initially, the students discuss what it means to be "smart" and how people can be smart in different ways. A different intelligence area is emphasized for each of the next seven days: bodily/kinesthetic, interpersonal, intrapersonal, logical/mathematical, musical/rhythmic, verbal/linguistic, and visual/spatial. After this has been completed, the seven intelligences are incorporated into daily lessons.

In addition, to accommodate students' different needs and strengths, Chapman (1993) feels that educators must employ multiple forms of assessment. For example, journals, portfolios, drawings, paintings, videos, and demonstrable skills are alternate forms of assessment. The multiple intelligences theory can help students capitalize on their skills. The definitive goal of these

efforts is to reach beyond the schools and into later life (White, Blythe, & Gardner, 1992).

Project Objective and Processes

As a result of implementation of a program to increase student engagement, during the period of September 1996 to December 1996, the targeted junior high school students will improve levels of motivation, thereby increasing academic growth, as measured by survey, teacher journal, and project/test assessments.

In order to accomplish the project objective, the following processes are necessary:

1. Learning activities that foster student awareness that knowledge and skills are transferable outside the classroom will be developed.
2. Students will be given the power of decision in the classroom.
3. Methods of teaching that employ the theory of multiple intelligences will be implemented.

Project Action Plan

I. PRE-ASSESSMENT OF MOTIVATION

- A. MSLQ questionnaire (Appendix A)
- B. Intelligence inventory (Appendix B)

II. TEACHING FOR TRANSFER

- A. Relate the Content
  - 1. Needs
    - a. think, pair share--why, when, where, how they need the concept taught
    - b. verbal discussion on past experiences
    - c. use graphic organizers to outline professions that use that skill (concept)
  - 2. Goals
    - a. students will write goals that relate the subject at hand to a life skill (Appendix C)

3. Interests
    a. use KWL (Appendix D)
    b. wrap-a-round--students listen and share thoughts on topics

B. Assessment
    1. On-going teacher journal (Appendix E)
    2. Test/Project
    3. Portfolio

III. STUDENT POWER OF DECISION

A. Projects
    1. Students help design rubric
    2. Choice of assignments
    3. Choice of learning methods
    4. Give responsibility
        a. completion of assignments
        b. classroom jobs to do

B. Review/Test
    1. Students write questions
    2. Choice of types of test
        a. performance
        b. multiple choice
        c. fill-in the blank
        d. projects

IV. TEACHING METHODS THAT EMPLOY THE THEORY OF MULTIPLE INTELLIGENCES

A. Introduction to seven intelligences (Appendix F)
    1. Intelligence inventory (Appendix B)
    2. Seven intelligences lessons (Appendix G)

B. Implementation of seven intelligences into subject area lesson plans/activities

V. POST-ASSESSMENT OF MOTIVATION

A. MSLQ questionnaire (Appendix A)
B. Teacher journal (Appendix E)

ACTION PLAN

The class selected for this intervention was chosen at random from the eight classes available. The selected class meets for 60 minutes, every-other day for approximately 12 weeks. This intervention plan is organized chronologically by content areas.

A. Pre-Assessment of Motivation
   1. MSLQ Questionnaire - Students will be given a questionnaire to assess their motivation levels. (Appendix A)
   2. Students will be given a seven intelligence inventory to assess their learning styles. (Appendix B)
   3. Students will develop classroom rules and consequences for their behavior.
   4. Introductory lesson to the seven intelligences (Appendix F)

B. Measurement Skills Unit
   1. Students will be allowed to select their cooperative work groups.
   2. Students will be introduced to two of the seven intelligences, with activities and lessons that reinforce the interpersonal and logical/mathematical intelligence. (P.M.I.) (Appendices G1,G2, and G3)
   3. Students will set content area goals.(Appendix C)
   4. Students will be given choices in the assignments they will perform in the content areas. (number of divisions per inch, micrometer reading, choice of assessment method)
   5. Students will relate how skills or content learned in class could be transferable outside of the classroom. (K.W.L.+ transfer) (Appendix D)

C. Technical Drawing Unit
   1. Students will be allowed to select their cooperative work groups.
   2. Students will be given choices in the assignments they will perform in the content areas. (technical drawings of items of their choice, using sketches, technical drawings or C.A.D.)
   3. Students will set content area goals.(Appendix C)
   4. Students will make portfolio entries.
   5. Students will be introduced to two of the seven intelligences, with activities and lessons that reinforce the visual/spatial and verbal/linguistic intelligences. (P.M.I.) (Appendices G4 and G5)
   6. Students will relate how skills or content learned in class could be transferable outside of the classroom. (K.W.L.+ transfer) (Appendix D)

D. Woodworking Unit
   1. Students will be allowed to select their cooperative work groups.
   2. Students will be given choices in the assignments

they will perform in the content areas. (choice of woodworking projects)
3. Students will set content area goals. (Appendix C)
4. Students will be introduced to three of the seven intelligences, with activities and lessons that reinforce the intrapersonal, bodily/kinesthetic and musical/rhythmical intelligences.(P.M.I) (Appendices G6, G7, G8 and G9)
5. Students will relate how skills or content learned in class could be transferable outside of the classroom. (K.W.L.+ transfer) (Appendix D)
6. Students will make portfolio entries. (P.M.I.)
7. Students, as a class, will develop a woodworking project self evaluation rubric and will use it to evaluate their work.(Appendix H)

E. Research and Design Unit (CO2 dragster)
1. Students will be allowed to select their cooperative work groups.
2. Students will be given choices in the assignments they will perform in the content areas.
3. Students will set content area goals. (Appendix C)
4. Students will make portfolio entries. (P.M.I.)
5. Students will relate how skills or content learned in class could be transferable outside of the classroom. (K.W.L.+ transfer) (Appendix D)
6. Students, as a class, will develop a CO2 dragster evaluation rubric and will use it to evaluate their work. (Appendix I)

F. Small Engines Unit (This unit may or may not be used due to time constraints.)
1. Students will be allowed to select their cooperative work groups.
2. Students will set content area goals.
3. Students will make portfolio entries. (P.M.I.)
4. Students will relate how skills or content learned in class could be transferable outside of the classroom. (K.W.L.+ transfer) (Appendix D)

G. Post-assessment of motivation
1. Students will be given a post-intervention survey to assess their post intervention motivation levels. (MSLQ) (Appendix A)
2. Students will assemble their work into a portfolio.

Methods of Assessment

In order to assess the effects of the intervention, student motivational surveys will be given before and after the

intervention to monitor any change in motivational development. In addition, assessments of student academic performance, teacher class records and teacher journal entries will be kept throughout the intervention period.

CHAPTER 4

PROJECT RESULTS

Historical Description of the Intervention

The intent of this study is to determine if adolescent motivation levels and academic achievement can be advanced through the use of multiple intelligence strategies, power of decision and teaching for transfer.

Howard Gardner's theory of multiple intelligences were used to arouse and direct students' curiosity of their learning styles and how students can use their knowledge of the seven intelligences to increase motivation levels and academic performance. In this study the concepts of giving students choice in classroom tasks and assessment methods were coupled with activities that fostered student awareness that knowledge and skills are transferable outside the classroom.

In order to accomplish the goals of the research project, students' in the industrial arts program, were introduced to the theory and practices of Howard Gardner's Multiple Intelligences (M.I.). Students were taught how to identify and utilize multiple intelligence strategies to their benefit in their learning environments. Initially, the students were asked to discuss their perceptions of what it means to be smart and how people can be smart in different ways. The students were also asked to complete the MSLQ which was used as a data gathering instrument to determine preintervention motivation levels. The theory of multiple intelligences was introduced to the students through the use of a descriptive handout (Appendix F). The handout was used in conjunction with classroom discussion which gave the students an overview of the principles and theories of the seven intelligences. Multiple intelligence teaching and learning methods were used in conjunction with cooperative learning to teach the intelligences and Industrial Arts subject matter. The students were asked to

complete a M. I. survey that would help them to identify their strongest intelligences (Appendix B). Discussion followed the tabulation of the survey and a PMI was completed by each student, for closure to the lesson.

During the next month the class was introduced to the seven intelligences in an order that coordinated with, and naturally inherent in, Industrial Arts classroom activities and units. The five main areas of study in Industrial Arts were precision measurement, technical drawing and CAD, woodworking, research and design, and small engines. Each Multiple Intelligence was taught as a separate unit and these multiple intelligence strategies were then incorporated into the subject area lesson plan. Class discussion was held at the end of each intelligence unit to enhance and reinforce the lesson objectives. PMIs were used for closure at the end of each intelligence lesson. KWLs were started at the beginning of each area of study and completed at the end of each unit.

At the beginning of each of the five main areas of study in industrial arts, students were asked to set short term attainable goals for the subject areas (Appendix C). Goals were set as a means to enhance students' sense of cognitive efficacy, their academic achievement and their intrinsic interest in the subject matter. Students then partially completed a KWL plus transfer worksheet (Appendix D).

At the end of each unit, students were given the choice about what type of assessment they preferred to use in each of the subject areas. The choices of these methods of assessment were pen and pencil tests, multiple choice tests, performance assessment, and developing questions for and the use of rubrics. KWL's were completed at the end of each instructional unit. These worksheets were used as a means to illustrate academic achievement and growth, with reflection on how these skills could be usable or transferable to areas outside the classroom.

The MSLQ was readministered to the class at the end of the twelve week session to determine postintervention motivational levels.

The precision measurement unit is the study of ruler reading, measurement, and micrometer use. The Intelligences taught with this unit were the interpersonal and logical/mathematical intelligences. The interpersonal intelligence was introduced first so that students could see how cooperative learning practices can be used to enhance student learning. This principle of learning by interacting with other students in group activities parallels industries' use of the team approach to problem solving. The logical/ mathematical intelligence was introduced in this particular unit so the students could apply their knowledge of this intelligence to develop the patterns and mathematical relationships inherent in the understanding of measurement practices. The knowledge of these patterns and relationships were helpful to students in being able to competently use and understand the various measuring devices. Sample lessons can be found in Appendices G1 and G2.

During the technical drawing and computer aided design unit, the principles of the verbal/linguistic and visual/spatial intelligences were introduced. The verbal/linguistic lesson stressed the various ways students use language (verbal and written) in order to best communicate their ideas. The students developed listening skills by role playing proper and improper listening behaviors (Appendix G5). In the technical drawing area, the sole use of verbal or written descriptions are limited because it is difficult to verbalize accurate descriptions of complex objects or shapes. This lesson was used as an anticipatory set to the introduction of the technical drawing and CAD unit. The need for the use of a graphic language, technical drawing, as a means to accurately communicate an object's shape, form, and dimensions, was introduced to and utilized by the students. The visual/spatial intelligence emphasizes

mentally manipulating shape, form, depth, and dimension; and the study of technical drawing demands that students use this intelligence in order to be sucessful in this field. A sample lesson can be found in Appendix G4.

The bodily/kinesthetic, musical/rhythmical, and intrapersonal intelligences were introduced during the woodworking unit. Bodily/kinesthetic intelligence enables us to control and interpret body motions, to manipulate physical objects, and to connect the body with the mind. A sample lesson can be found in Appendix G8. Woodworking, being a hands-on unit by its very nature, relies upon the bodily/kinesthetic intelligence to aid students in mastering class content. Students learned how body movement, through the manipulation of materials and machines, may enhance their academic performance in learning subject matter. The musical/rhythmical intelligence is the ability to use the musical elements of pitch, rhythm, and tone, in conjunction with the awareness of sound in one's environment. Lessons using the musical/rhythmic intelligence as a means to set emotional moods and the use of mnemonics to aid in learning and remembering were used to introduce this intelligence. A sample lesson can be found in Appendix G9. In the woodworking unit, students would evaluate the pitch, tone, and sounds made by various woodworking machines to determine if the machines were being operated and used in a correct manner. The intrapersonal intelligence is the ability to think, reflect, and complete accurate self-assessments of one's feelings and abilities. This reflection helps students take control and responsibility for their learning, actions, and behavior. The introductory lesson required students to generate a list of "put-ups" and "put-downs" and to reflect on their feelings as they used and received these types of comments (Appendix G7). This self analysis of one's thoughts and feelings were used to develop a basic understanding of the intrapersonal intelligence. Students used the intrapersonal intelligence to perform self-assessments of their feelings, efforts, and commitment to learn subject objectives.

PMIs, KWLs and goals were used by students to encourage their self assessment and record their reflections.

The Research and Design unit was used as a culminating activity and exercise in incorporating all previous lessons together to result in a final project. Students were asked to design and build a model drag racing car out of wood and to test their design in competition with other students in the class. M.I. strategies were used to present the material in the lesson, and students utilized their knowledge of M.I. strategies and problem solving skills to develop solutions for any problems encountered in the design assignment.

The Small Engines unit was not used due to constraints caused by time diverted from curricular areas to teach the multiple intelligences.

The MSQL was administered at the end of Industrial Arts program to assess any change in student motivation levels.

Presentation and Analysis of Results

In order to asses the effects of using M.I. strategies, student power of decision and teaching for transfer as a means to increase motivation levels of Junior High School students, data was collected using the MSLQ, teacher observations and student worksheets that included PMI's, K.W.L.'s and goals. In order to facilitate analysis of data collected using the MSLQ, all true and more or less true responses are being aggregated. The MSLQ was used as the principle data gathering instrument and was administered before and after the intervention to determine any change in student motivation levels. The questionnaire surveyed three areas of student motivation: value components that include intrinsic motivation, extrinsic motivation, and task values; expectancy components of students control beliefs and self efficacy; and test anxiety. The results of the value component section of the MSLQ are reported in Table 4 and illustrated in Figure 4.

Table 4

Value Components: Number of Student Responses to the Pre and Post MSLQ, With Student Response Percentages.

Component:	1 not true	2 more or less not true	3 more or less true	4 very true	total number of student responses
Intrinsic Goal Orientation Questions 1-4	pre post 14 18 19% 25%	pre post 19 20 26% 28%	pre post 23 20 32% 28%	pre post 16 14 22% 19%	72
Extrinsic Goal Orientation Questions 5-8	pre post 9 13 12% 18%	pre post 13 11 18% 15%	pre post 11 18 15% 25%	pre post 39 30 54% 42%	72
Task Value Questions 9-1	pre post 14 26 13% 24%	pre post 31 27 29% 25%	pre post 32 28 30% 26%	pre post 31 27 29% 25%	108

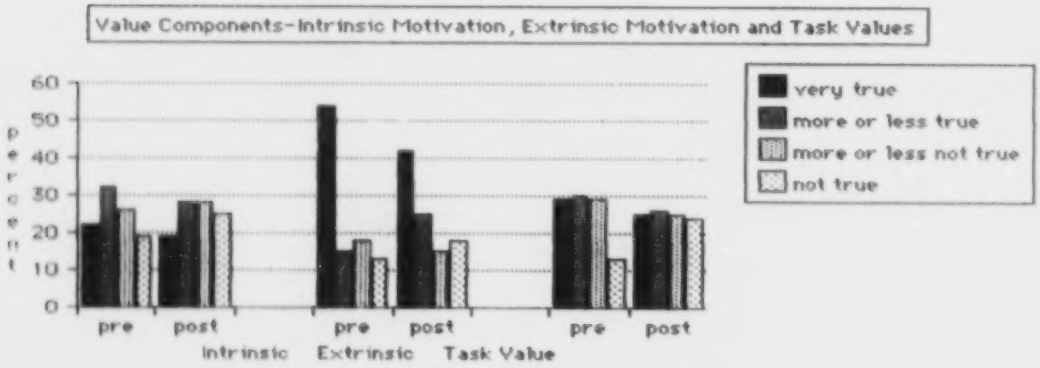

Figure 4. Value Components and Student Response Percentages to the Pre and Post Intervention MSLQ Questionnaire.

The results of the value component section of the post MSLQ indicate that student extrinsic motivation levels dropped by 2% during the intervention. This lack of noticeable change indicates that grades and extrinsic rewards continue to be highly motivating factors to students. Interesting to note, when true responses are analyzed, there was a 12% shift of responses, from very true to more or less true responses. This shift could indicate that student extrinsic motivation orientations are moving toward being more intrinsic by nature. Teacher observations in the classroom support the results of the questionnaire, because student concerns for and about grades seemed to be the driving force in students' efforts to master classroom material. Student intrinsic value as reported in the questionnaire, show that intrinsic motivation levels dropped by 7% during the intervention.

This drop in intrinsic motivation may be related to the fact that students' task value scores declined by 8 % during the same time period. Task value is the students' perception of the class as having interest, importance, and utility. This reduction in perceived utility can be illustrated by student responses to question 12 in the MSLQ. The question states, "I think the course material in this class is useful for me to learn."

The preintervention questionnaire reported that 13 of 18 (72%) of the students indicated that material in the class was useful for them to learn. The post intervention questionnaire reported that only 8 of 18 (45%) of the students, felt that the classroom material was useful to learn. This drop in interest, importance, and utility could be assumed to have a negative impact on student intrinsic motivation levels.

The expectancy components section of the MSLQ reports on student control beliefs, and self-efficacy. Both expectancy components scores dropped during the intervention period as reported in Table 5 & illustrated in Figure 5.

Table 5

Expectancy Components: Number of Student Responses to the Pre and Post MSLQ, With Student Response Percentages

Component:	1 not true	2 more or less not true	3 more or less true	4 very true	total number of student responses
Control Beliefs Questions 15-18	pre post 13 14 18% 19%	pre post 9 15 13% 21%	pre post 16 20 22% 28%	pre post 34 23 47% 32%	72
Self-Efficacy Questions 19-26	pre post 10 19 7% 13%	pre post 22 32 15% 22%	pre post 46 39 32% 27%	pre post 66 54 45% 38%	144

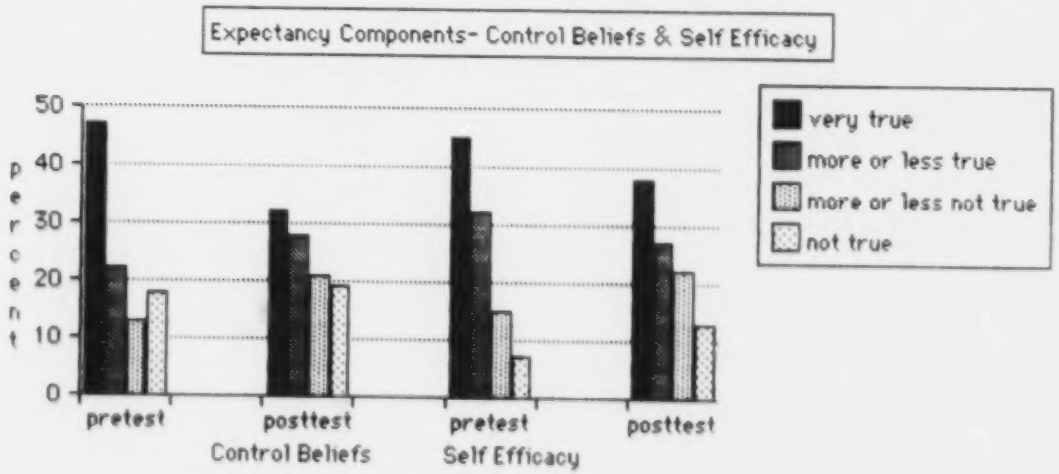

Figure 5. Expectancy Components and Student Response Percentages to the Pre and Post Intervention MSLQ Questionnaire.

Students report their control beliefs, that results are contingent upon one's own effort, dropped by nine-percent during the intervention. This drop in control beliefs was reflected in the students' answers to question 17 in the MSLQ. The question states, "If I try hard enough, then I will understand the course material." Pretest responses by 17 of 18 (94%) of the students reported a true response to this question. During the post test 9 of 18 (or 50%) of the students reported a true response. This drop in control beliefs could be directly related to students exhibiting less effort to complete class tasks as was observed by the instructor. Self efficacy, student appraisal of one's ability to master class tasks, also dropped by 7% during the intervention period. This drop in students' perceptions of their abilities to master class tasks was expected by the instructor, as students usually underestimate the effort required of themselves to perform class tasks well. This reduction in student control beliefs and self efficacy might be seen to have a detrimental effect on students' intrinsic motivation levels.

The affective components of the MSLQ examined the levels of anxiety students experienced during test taking. Test anxiety has been found to be negatively related to student expectancies and academic performance. The results of the affective components section of the MSLQ are reported in Table 6 and illustrated in Figure 6.

Table 6

Affective Components: Number of Student Responses to the Pre and Post MSLQ with Student Response Percentages.

Component	1 not true		2 more or less not true		3 more or less true		4 very true		total number of student responses
	pre	post	pre	post	pre	post	pre	post	
Test Anxiety Questions 27-31	39 43%	34 38%	11 12%	14 16%	12 15%	22 24%	28 31%	20 22%	90

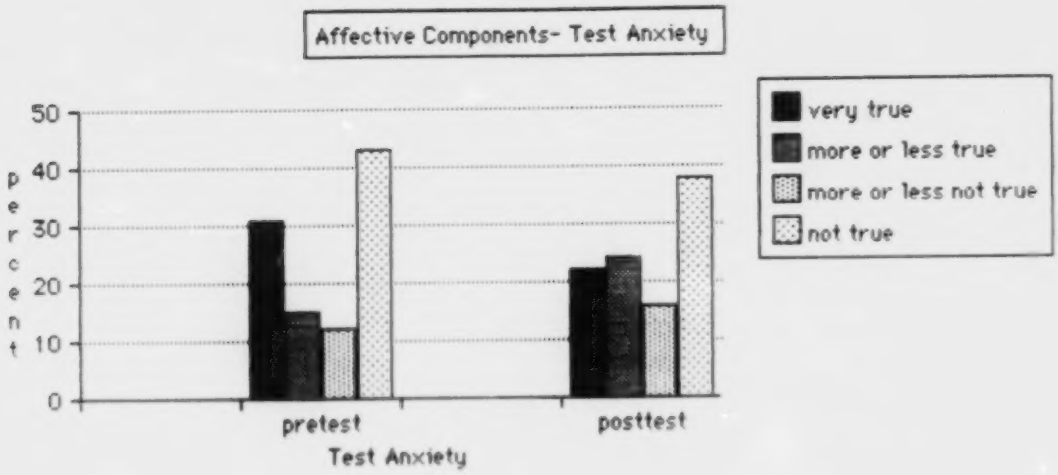

Figure 6. Affective Component and Student Response Percentages to the Pre and Post Intervention MSLQ Questionnaire.

The percentage of true and not true responses to the MSLQ indicated that test anxiety, as experienced by the students, did not change during the intervention period. When very true and more or less true responses are compared, students reported there was a 9% reduction in very true responses. This moderating effect at the extreme end of the scale may indicate that giving students choice in their assignments and assessment method, could allow students to experience test anxiety at diminished levels. This drop in perceived test anxiety levels and students' choice in assignments and assessment may result in a more realistic evaluation of students' efforts and academic achievement. Training in the use of multiple intelligence strategies could increase student confidence in their learning abilities and be seen to help reduce the intensity of test anxiety.

Conclusions

Based on the presentation and analysis of the data from the MSLQ, it can be assumed that the teaching of multiple intelligences with the implementation of M. I. strategies had little or no impact on student motivation levels. It might be assumed that

the use of M.I. strategies may affect the methods and manner in which students approach or attempt to master classroom tasks, and indirectly effect change in motivation levels. Although teacher observation indicated that students exhibited more time on task with greater involvement in learning tasks when M.I. strategies were employed, these motivation level changes were not documented using the MSLQ. It should be noted at this point, that the short duration of the intervention period (students attended class every other day for 12 weeks or 30 days total), would make it difficult to effect change in amounts that would be easily or accurately measured. Also, due to the small size of the intervention group, any change in responses by one student from true, to not true could reflect a 6% change in the group orientations. Task value, control beliefs, and self efficacy were seen as having a direct impact on student intrinsic motivation levels, more than the teaching and use of the multiple intelligences.

As reported in the affective components section of the MSLQ, students reported a moderating affect on the very true and not true response to questions concerning the amount of stress experienced during test taking. Giving students choice in assignments and assessment methods may have positively affected students and may allow a more realistic appraisal of students' efforts to learn class material. Students showed little transfer to other classes or life, of skills learned during the intervention period. Students seemed to have little background in career awareness and the skills necessary to be successful in these careers. Responses to the KWL and transfer worksheets, reflected a narrow scope of responses or the repetition of applications that were used by the teacher as examples. The PMI's used at the end of each intelligence lesson were equally lacking in depth of responses, and application to other areas of study or careers. It is the researcher's opinion that the use of KWL's and PMI's were of little value in this project.

Recommendations

Based on the presentations and analysis of data from the MSLQ and teacher observations, recommending the intervention without adaptation would be impossible.

Motivation is an internal process that drives and sustains effort to master tasks, and is directly affected by class content and relativity to students' lives. The application of external stimulation through introduction of M.I. strategies may influence short term motivation levels. To have lasting effect, the interventions should be used for extended time periods, and throughout the subject areas and school years. The use of M.I. strategies for the presentation of class materials and its use by teachers and students should be encouraged. Students' adoption of M.I. strategies and learning through their strongest intelligences would allow students to be more successful in learning class material. The use of MI strategies may have impact on student control beliefs and self efficacy, thus affecting their motivation levels.

The MSLQ is a self report instrument and its reliability and accuracy is dependent upon accurate self appraisal and honesty by the student. The MSLQ may report results more accurately or meaningful to the student, if it were to be used on an individual basis. Direct instruction of useful strategies and study skills could then be taught to the student. The application of these different study skills by the students may improve their academic achievement. If the MSLQ is not used on an individual basis, then group size should be large enough so that one individual's response change does not effect the groups' report significantly.

The power of student decision making, goal setting, and involvement in the assessment process was seen to have positive results on student achievement and motivation levels. When students have some control over course content and the evaluation process, they seem to take ownership and responsibility for their results. The metacognative process of self-evaluation is an excellent way to have students

examine their academic achievement, and reflect on their efforts

Future research could analyze relationships between task value as perceived by students, with academic achievement and/or the effects on student motivation .

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APPENDICES

APPENDIX A

QUESTIONNAIRE

The following questions ask about your motivation for and attitudes about this class. Remember there are no right or wrong answers, just answer as accurately as possible. Your responses will help me understand your learning preferences; your responses will not affect your grade. Use the scale below to answer the questions. If you think the statement is very true of you, circle 4; if a statement is not at all true of you, circle 1. If the statement is more or less true of you, circle 3. If the statement is more or less not true of you, circle 2.

1 not at all true of me 2 3 4 very true of me

	not at all true of me			very true of me
1. In a class like this, I prefer course material that really challenges me so I can learn new things.	1	2	3	4
2. In a class like this, I prefer course material that arouses my curiosity, even if it is difficult to learn.	1	2	3	4
3. The most satisfying thing for me in this course is trying to understand the content as thoroughly as possible.	1	2	3	4
4. When I have the opportunity in this class, I choose course assignments that I can learn from even if they do not guarantee a good grade.	1	2	3	4
5. Getting a good grade in this class is the most satisfying thing for me right now.	1	2	3	4

6. The most important thing for me right now is improving my overall grade point average, so my main concern in this class is getting a good grade.	1	2	3	4
7. If I can, I want to get better grades in this class than most of the other students.	1	2	3	4
8. I want to do well in this class because it is important to show my ability to my family, friends, employer, or others.	1	2	3	4
9. I think I will be able to use what I learn in this course in other courses.	1	2	3	4
10. It is important for me to learn the course material in this class.	1	2	3	4
11. I am very interested in the content area of this course.	1	2	3	4
12. I think the course material in this class is useful for me to learn.	1	2	3	4
13. I like the subject matter of this course.	1	2	3	4
14. Understanding the subject matter of this course is very important to me.	1	2	3	4
15. If I study in appropriate ways, then I will be able to learn the material in this course.	1	2	3	4
16. It is my own fault if I do not learn the material in this course.	1	2	3	4
17. If I try hard enough, then I will understand the course material.	1	2	3	4

18. If I do not understand the course material, it is because I did not try hard enough.	1	2	3	4
19. I believe I will receive an excellent grade in this class.	1	2	3	4
20. I am certain I can understand the most difficult material presented in the readings for this course.	1	2	3	4
21. I am confident I can understand the basic concepts taught in this course.	1	2	3	4
22. I am confident I can understand the most complex material presented by the instructor in this course.	1	2	3	4
23. I am confident I can do an excellent job on the assignments and tests in this course.	1	2	3	4
24. I expect to do well in this class.	1	2	3	4
25. I am certain I can master the skills being taught in this class.	1	2	3	4
26. Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class.	1	2	3	4
27. When I take a test I think about how poorly I am doing compared with other students.	1	2	3	4
28. When I take a test I think about items on other parts of the test I cannot answer.	1	2	3	4

29. When I take tests I think of the consequences of failing.	1	2	3	4
30. I have an uneasy, upset feeling when I take an exam.	1	2	3	4
31. I feel my heart beating fast when I take an exam.	1	2	3	4

Adapted from: Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1991). A manual for the use of the motivated strategies for learning questionnaire (MSLQ). Ann Arbor,MI: National Center for Reserach to Improve PostSecondary Teaching. (ERIC Document Reproduction Service No. Ed 338 122).

WHERE DOES YOUR TRUE INTELLIGENCE LIE?

This quiz will help you identify your areas of strongest intelligence. Read each statement. It if expresses some characteristic of yours and sounds true for the most part, jot down a "T." If it does not, mark an "F." If the statement is sometimes true, sometimes false, leave it blank.

1. _____ I would rather draw a map than give someone verbal directions.
2. _____ If I am angry or happy, I usually know exactly why.
3. _____ I can play (or used to play) a musical instrument.
4. _____ I can associate music with my moods.
5. _____ I can add or multiply quickly in my head.
6. _____ I can help a friend sort out strong feelings because I successfully dealt with similar feelings myself.
7. _____ I like to work with calculators and computers.
8. _____ I pick up new dance steps fast.
9. _____ It is easy for me to say what I think in an argument or debate.
10. _____ I enjoy a good lecture, speech, or sermon.
11. _____ I always know north from south no mater where I am.
12. _____ I like to gather together groups of people for parties or special events.
13. _____ Life seems empty without music.
14. _____ I always understand the drawings that come with new gadgets or appliances.
15. _____ I like to work puzzles and play games.
16. _____ Learning to ride a bike (or skates) was easy.
17. _____ I am irritated when I hear an argument or statement that sounds illogical.
18. _____ I can convince other people to follow my plans.
19. _____ My sense of balance and coordination is good.
20. _____ I often see patterns and relationships between numbers faster and easier than others.
21. _____ I enjoy building models (or sculpting).
22. _____ I am good at finding the fine points of word meanings.
23. _____ I can look at an object one way and see it turned sideways or backwards just as easily.
24. _____ I often connect a piece of music with some event in my life.
25. _____ I like to work with numbers and figures.
26. _____ I like to sit quietly and reflect on my inner feelings.
27. _____ Just looking at shapes of buildings and structures is pleasurable to me.
28. _____ I like to hum, whistle, and sing in the shower or when I am alone.
29. _____ I am good at athletics.
30. _____ I enjoy writing detailed letters to friends.
31. _____ I am usually aware of the expression on my face.
32. _____ I am sensitive to the expressions on other people's faces.
33. _____ I stay "in touch" with my moods. I have no trouble identifying them.
34. _____ I am sensitive to the moods of others.
35. _____ I have good sense of what others think of me.

intellig.lie (Summer 1996)

APPENDIX B

Multiple Intelligence Inventory Score Sheet

Body-Kinesthetic

8	16	19	21	29	T	F	Blank	

Verbal-Linguistic

9	10	17	22	30	T	F	Blank	

Musical-Rhythmic

3	4	13	24	28	T	F	Blank	

Visual-Spatial

1	11	14	23	27	T	F	Blank	

Intrapersonal

2	6	26	31	33	T	F	Blank	

Interpersonal

12	18	32	34	35	T	F	Blank	

Logical-Mathematical

5	7	15	20	25	T	F	Blank	

GOALS
PRECISION MEASUREMENT

Name_____**per.**__

At the present time I feel I can **comfortably** and **accurately** measure with a ruler to an accuracy of:

☐ 1/2" ☐ 1/4" ☐ 1/8" ☐ 1/16" ☐ 1/32" ☐ 1/64"

At the end of the precision measurement unit **My goal** is to comfortably and **accurately** measure with a ruler to:

☐ 1/2" ☐ 1/4" ☐ 1/8" ☐ 1/16" ☐ 1/32" ☐ 1/64"

I would like to challenge myself and learn to read and use a tool called a **micrometer** The micrometer is capable of making measurements accurately to one thousandth of an inch . ☐ yes ☐ no

Now that I have completed the measurement unit I feel I can **comfortably** and **accurately** measure with a ruler to an accuracy of:

☐ 1/2" ☐ 1/4" ☐ 1/8" ☐ 1/16" ☐ 1/32" ☐ 1/64"

Did you **meet** or **exceed** your goals ? _____

TRANSFER: I will be able to use my measurement skills in? Give examples (ex school work-what subject? at home-where? in my career-how?)

_____

_____

_____

_____

Name _____55
Period_____

Goals

Technical Drawing, Computer Aided Design

Major goals - To be successful in technical drawing and CAD, I will need to be able to use, produce and understand a variety of drawing practices used in industry.

To reach my goals I will need to learn to use and produce the following types of technical drawings:

scale: 1. not successful to 5. very successful

1. **Oblique Drawings (pictorial)** Sketching

before /----------/ 1 3 5

after /----------/ 1 3 5

2. **One Point Perspective** Sketching

before /----------/ 1 3 5

after /----------/ 1 3 5

3. **Orthographic Projection** Sketching

before /----------/ 1 3 5

after /----------/ 1 3 5

COMPUTER AIDED DESIGN 56

To reach my goals I will need to learn to use and produce the following types of technical drawings using C. A. D.

1. **Oblique Drawings**

before

/----------/

1 3 5

after

/----------/

1 3 5

2. **One Point Perspective**

before

/----------/

1 3 5

after

/----------/

1 3 5

3. **Orthographic Projection**

before

/----------/

1 3 5

after

/----------/

1 3 5

I will be able to use, read and dimension an oblique and orthographic projection drawings.

before

/----------/

1 3 5

after

/----------/

1 3 5

I feel I have successfully completed my goals.

/----------/

1 3 5

Goals

Woodworking Unit

Major goals - I will successfully complete a woodworking project to the best of my ability.

scale: 1. not successful to 5. very successful

before

/----------/

1 3 5

after

/----------/

1 3 5

To accomplish my goals, I will need to use a variety of woodworking equipment. I feel confident that I will be able to identify, set up, and perform operations on the following machines:

-band saw: before

/----------/

1 3 5

after

/----------/

1 3 5

-jointer: before

/----------/

1 3 5

after

/----------/

1 3 5

-miter saw: before

/----------/

1 3 5

after

/----------/

1 3 5

APPENDIX C (3 of 5)

-drill press: before

/----------/

1 3 5

after

/----------/

1 3 5

-radial arm saw: before

/----------/

1 3 5

after

/----------/

1 3 5

-jig saw: before

/----------/

1 3 5

after

/----------/

1 3 5

-router: before

/----------/

1 3 5

after

/----------/

1 3 5

I feel confident that I will be able to sand, stain, and finish my project successfully.

before

/----------/

1 3 5

after

/----------/

1 3 5

I feel I did a good job incorporating the skills of measuring, technical drawing, and woodworking in the completion of my project. /----------/

1 3 5

I feel I successfully completed my goals. /----------/

1 3 5

If I were doing this project over again, I would:

_____

_____

Goals

CO2 Dragster

My goals for the CO2 dragster are:

1. _____
2. _____
3. _____
4. _____

To successfully reach my goals I will need to: (examples: rough sketches, final drawings, aerodynamics, weight to thrust ratio)

1. _____
2. _____
3. _____
4. _____

To successfully reach my goals I will also need to: (examples: cut accurately with band saw, sand, paint)

1. _____
2. _____
3. _____
4. _____

I feel I have successfully completed my goals.

/----------/ (1. not successful to 5. very successful)

1 3 5

If I were doing this project over again, I would:

_____

_____

INDUSTRIAL ARTS
K. W. L.
Transfer

NAME-_____

DATE-_____

Subject:_____

K- What do I know about the subject.

_____

_____

_____

_____

W- What do I want to know about the subject.

_____

_____

_____

_____

L- What I have learned or thought was interesting about the subject.

_____

_____

_____

_____

Transfer: How can this subject or lesson be used in in your future. (example: other subjects, jobs, careers.)

_____

_____

_____

APPENDIX

JOURNAL ENTRIES

WEEK OF 9/3 (61)

STEVEN JANS

ACTIONS TAKEN:

- INTRODUCED THE 7-INTELLIGENCES 9/3 & 9/5
- DEVELOPED COOP WORK GROUPS.
- TOUCHED UPON INTERPERSONAL INTELL TO BE CONTINUED NEXT WEEK

MEET 4 TIMES THIS WEEK
INTRO & MEASUREMENT UNITS

Initial Observation	Upon Reflection
Students were somewhat interested in the fact that there were only 7 main intelligences but seemed confused about the types of intelligences & how it may apply to item 1. It was explained to item that individuals develop intelligences at different rates and strengths.	- further discussion is needed to let students know how to use and develope the intelligences of in the future students could dry to match their strengths with those of the teacher they'll have in H.S. or college - items could be the reasons why some students do better in math, science, etc and some better in language S.S. . - Also that the intelligences could be strengthened by many item

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JOURNAL ENTRIES

WEEK OF 9/9

STEVEN JANS

63

ACTIONS TAKEN:

9/9 - INTRODUCED INTERPERSONAL INT. (SHOE P187)

9/11 - INTRODUCED LOGICAL/MATH " (SHOE P96)

- USED WEB

- USED PMI

9/13 - PARTICIPATED [illegible]

Verbal [illegible]

[illegible]

[illegible]

Initial Observation	Upon Reflection
- AT THIS TIME OF THE INITIAL LESSONS.	- THE INTRO LESSON THAT [illegible] WHERE WE HELD A SEMINAR ON ACTIVITY TO DEFINE THE CONCEPT OF INTERP. INT.
- STARTED AS A VISUAL/SPATIAL ACTIVITY FOLLOWING THE 7 INT. WHAT THEY ARE AND RESEARCH HOW WE USE THEM TO LEARN.	- MOST STUDENTS REFLECTED IN THEIR PMI THAT THIS IS THE PREFERRED METHOD TO CONDUCT CLASS & MAKE LEARNING FUN
- DISCUSSED EXAMPLES	
- DISCUSSED INTERPERSONAL INTELLIGENCE	
- COMPLETED THINK-PAIR SHARE ON MEASUREMENT APPLICATIONS IN CHAPTER	- ONE STUDENT COMPLAINED THAT THE T.P.S. WAS TOO NOISY & DISTRACTED HIS WORK.
- COMPLETED WEB IN CONJUNCTION WITH T.P.S.	- STUDENTS LIKE TO SHARE THEIR IDEAS WITH OTHERS - THEY CAME UP W/ MORE EXAMPLES THAN WE THOUGHT THEY COULD ALONE
- STUDENTS COMPLETED PMIS	- USED THINK PAIR SHARE STUDENTS CAME UP WITH BIG LINES = BIG DIVISIONS LITTLE LINES = SMALLER DIVISIONS
- INTRODUCED LOG/MATH (SHOE P96)	- LARGE # OF DIVISIONS PER " = SMALL PIECES
- LOG/MATHEMATICAL BRAINSTORMED WHY DIVISIONS WERE DIFFERENT LENGTHS DEVELOPED PATTERN	SMALL # OF " " " = BIG "
BEST COPY AVAILABLE	PMI. LACK DEPTH IN RESPONSES SOME/MORE NOT COMPLETED INTER, LOG/MA

9/13 - VERBAL/LINGUISTIC (SHOE P84) + LISTENING SKILLS TO TECH DRAWING AND NEED FOR DRAFTING

- Negotiated a verbal discussion - the [illegible] Students verbal

JOURNAL ENTRIES

WEEK OF 9-9

STEVEN JANS

63

ACTIONS TAKEN:

INTRODUCTORY LESSON — LOGICAL/MATH - "PIG"

LESSON EXAMPLE 2 - COIN PUZZ/ ACT 1 & 2

DISCUSSION QUESTIONS

DISCUSSION AT A-P INT. USED

B-K - INTERP - V.S.

PMT -

Initial Observation	Upon Reflection
<illegible>	<illegible>
<illegible>	<illegible>
— <illegible>	<illegible>
<illegible>	
<illegible>	STUDENT <illegible>
<illegible>	STUDENT WHO <illegible>
<illegible>	- SOME STUDENTS <illegible>
— SOME STARTED NOT	<illegible>
<illegible>	<illegible>
<illegible>	<illegible>
— <illegible>	
<illegible>	
ABOUT THE COINS ETC	
— IT TOOK LONGER FOR	
SOME STUDENTS TO	
FIGURE IT OUT - ALL	
FINISHED -	
— SECOND ACT SIX COINS	8
STUDENT WORKED FOR	
ALMOST 5 MINUTES EVEN	
THE ADV ALGEBRA STUDENTS	
WERE SAYING IT WASN'T	
BE EASY - NO SPEC. ED	
STUDENTS SOLVED THE PROB	
IN TWO MINUTES.	
PUT COINS ON OVERHEAD &	
SP. ED. SHOWED HER SOLUTION.	

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JOURNAL ENTRIES

WEEK OF 9/6/96

STEVEN JANS

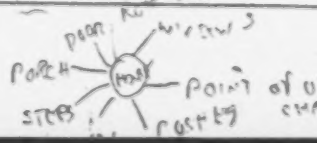
64

ACTIONS TAKEN:

9/17 INTRODUCED * VISUAL-SPATIAL INTELLIGENCES 9/17

9/19

Initial Observation	Upon Reflection
STUDENTS UNDERSTAND THE CONCEPTS OF VISUAL/SPATIAL IN AND COULD GIVE BOTH EXAMPLES OF	
ITS SHAPE	
POINTED OUT WAYS COULD BE USED TO ORGANIZE PICTURE OF HOUSE CLASSIDAS GROUP	C.A.D. UNIT WENT VERY WELL - BUILT UPON COMPUTER SKILLS TRAIN LOWER GRADES. -USED LINKWAY AS OUR C.A.D. PROGRAM EVEN THOUGH IT HAS LIMITATIONS



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JOURNAL ENTRIES

WEEK OF 9/ - 12/

STEVEN JANS

65

9/25 - Started Woodworking

ACTIONS TAKEN:

9/27 introduced * Basic / # inside cut [illegible]

- learning to work - Kaplan [illegible]

- circle [illegible]

- used body motion to [illegible]

of woodworking machines and as an [illegible]

remembering them [illegible]

and Track 9/24

Was in shop 5 days [illegible]

Initial Observation	Upon Reflection
Used circle saw - then students should use knife and then use [illegible] help and remember machine operation and use safely - Jointer operation - same basic working like saw use - Tomorrow check to see the miter saw - Drill press - will test tomorrow - Radial saw in - same external and use it in same (radial line) - Band Saw - played like guitar - Stress - use to blade placed - Blade is one band & stick w/ teeth - Discussed how actual use or manipulation of an object help us to remember names and help learn the material - as opposed to verb/lie / this approaches only (restrictions) - Instructional layout w/ all students how the connection between body	[illegible] learning (- [illegible] [illegible] [illegible] [illegible]

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JOURNAL ENTRIES

WEEK OF 9/30/96

STEVEN JANS

66

ACTIONS TAKEN:

10/1 Introduced 1) Physical / hysterical inertia

10/3 → Introduced 2) Agent for Inertia Point

used - Imp. - Imp.

- Vis / Pa - Vis / Pa

- P →

Topic

Pat

Initial Observation	Upon Reflection
2) One student commented to me that a third student was making fun of and ridiculing "Ian Parker and it not cool."	The use of words in sounds frustrating "s" and "t" sounds
- This would be a good time to introduce the interpersonal intell.	- Journal Writing
- Used co-op groups to create a list of Don't Laws	- Tools -
- then put up on web	
- Used 3 stem statements	
1) Edgewise doesn't make you look personally when someone passes you down.	
2) Tell your teacher when your friends have put-up or discouraged cowardly student	
3) Remember the "Golden Rule" How do you want to be perceived	
4)	

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PAGE 2

JOURNAL ENTRIES

WEEK OF 9/-- 1/4

STEVEN JANS 67

ACTIONS TAKEN:

[illegible]

Initial Observation	Upon Reflection
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

JOURNAL ENTRIES

WEEK OF Oct 7

STEVEN JANS 68

ACTIONS TAKEN:

Meet Oct 7-9-11

- Student Work Week in Woodworking
- Daily the dust used in Woodworking
  - Think-Pair-Share

U/S - Lx/M, INTER, BK, M/R INTERPOL

Initial Observation	Upon Reflection
V is Pat - see Machine - Visualize the operation - What it should look like when completed B/L - feel motion of body parts to remember operations - feel body motion to remember machine purpose/name - feel wood being cut Mus/R - Machine sounds when proper and enjoyable work Inter - have partner critique work or reinforce question of operation/steps - or V work. Verb/Ling - Talk to yourself - Verbalize what your going to do & the steps to do it. Log/Math - Remember Mathematical JMRJ Conc for sequence of operations - Ruler Use & Division Intra - am I doing the best work I can do? - Do I feel confident using the machine if not get help	Discussion Students felt they were starting to get the practical applications of how to be intelligent. Time used & how to set them recall info later. - See T-dust can be used together to make them better students

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JOURNAL ENTRIES

WEEK OF 10/15/96

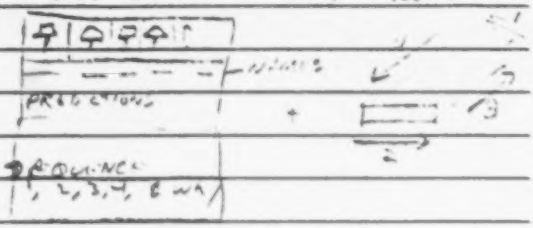
STEVEN JANS

.69

ACTIONS TAKEN:

10-16 Lesson Use - Smat. prediction and Conclusion - Square dance Lesson - Router Bits on Overhead - w/ Shark Activity Lesson

Make Graphic Organizer



10-17 - Overviewed - Lesson I remember be ...

Router - ... in T ...

Initial Observation	Upon Reflection
Mixed enthusiasm to the use of the router. Students were skeptical about how and where bits would be used in their projects.	I used this lesson with all of the classes and had a hard time applicating ideas. ex. Because of a quick ... of the router ... found and ... for high RPM & problems ... with speed
Student predicted the use of the bits well and came up with interesting ideas even if the application was wrong ex used in drill press - good thinking & creative application since she didn't know the bits needed to turn at higher RPMs than Drill Press could deliver.	* I was enthused by the success of the lesson that after classes and assumed it would go well with the intermediate classes, it didn't - Students seemed to be asleep or tired and used little of the skills of prediction application or higher level thinking skills - I was so disappointed in the results - will see what the students thought when I review the "RMI."
- need to reassess short term & long term course of actions	

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JOURNAL ENTRIES

WEEK OF 10/22

STEVEN JANS

70

ACTIONS TAKEN:

10/22 V/S - SOAT
LISTENING SKILL

& Abrasives - Rough then fine with rock.
& Wood finishing - Sequence & Steps [illegible]
Rabbit: rub - wipe on - wipe off

Initial Observation	Upon Reflection
We discussed and demonstrated the use of abrasives & Wood finishing - Display Bd w project with - final finish & one with a poor finish result - Compare/Contrast - What we wanted our project to look like - what we needed to know to get there * Critical difference between poor appearance was obtained - sequence marks / swirl marks / fine ele & How to eliminate - observing SO-170 DEMO	Compare - Contrast [illegible] final VS [illegible] V/S - discrimination [illegible] a wise & like [illegible] between [illegible] and know it when [illegible] Contrast [illegible] with known finish 2/22 - Transfer - [illegible] for a task & [illegible] Lang Learners Students like use Rabbit Bd Wipe on - Wipe off Urinal / BK Chair for S.A finishing accomplished We need to speed up our process or we want be finished on time.

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Journal Double Entry

Lesson - Visit Sprint w/ BK Support for Aerodynamics - wind resistance
Set Goals for speed / when CO_2 car Design - fastest time .72 sec / 50 ft

NAME: Steven Jans DATE: 10/26/06

Subject: Industrial Arts-

Initial Observation	Upon Reflection
Visual - Sprint - Aerodynamics - Students are to observe experiment riding in a car until the world does. Students are to mentally perform aerodynamic test / to flutter wind out of the windshield & look at the effect of wind on their hands / notice "What happens when I put my hand to the wind - What happens when your hand is tilted slightly up or down Do you feel the wind resistance has effect on your car as it gets down the track What can we do to reduce this friction Brainstorm - w/ groups as many ideas as possible to reduce drag & explain why it will reduce drag - assignment Complete schematic and rough sketches for your individual design-	Students came up with many good ideas from visible and textual dimensions of objects that are around, manmade and animals. Each student cars / different kinds and reasons different Students are becoming aware of the intelligence that is used or applied to different applications Reflect your Day

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JOURNAL ENTRIES

WEEK OF 11/4

STEVEN JANS

72

ACTIONS TAKEN:

Final Drawing of CO2 Cars.

Discussion - Vis/Spat - appearance & care (aero?)
- Mat/Fy - Mech. Mat Effic. on Eqn & Mass
- Inter - teams of 2 students working on design
- Intrapersonal - own ideas & Reflections on design
- BK - Drawing & Design

Initial Observation	Upon Reflection
Onto Next Week, 5th introduced - design criteria for CO2 Cars. used the mult. int. as a discussion platform to reinforce 7-2nd. Vis-Spat - Mentally see main of finished car - Mat/Fy - assess aspects in the design process - Safety - even comp. compare MI to player on BB team in Jan 1st/ Interp - linked drawing ideas off each other in design process BK - actual drawing and start construction of car Prototype Intra - "own" ideas, feelings	used discussion as a mode for reviews of MI Time is dramatic variation in the amount & quality of work completed Students are failing in work needed to be accomplished to the end of the +2 weeks. Most successful projects are at least 3 days ahead Students identified & intell. used in the design process & think these students in the have the intell. abs applied or used and in what areas. Students acknowledge that their strengths would affect their end results or design.

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JOURNAL ENTRIES

WEEK OF 11/12

STEVEN JANS
73

ACTIONS TAKEN:

extra - Self evaluation of Words Power
"what would you have done differently"
"what have you learned
analysis & discussion & appointments - compared to previous
B-K - actual work with students to construct own test
VB/L - follow up with interviews for next Wed. & Thurs.

Initial Observation	Upon Reflection
met 2 days. 11/12 - 11/14	Evaluation shows varied changes to reflect the students attitudes and appraisal of "what was learned" and the end results of their efforts Students seem the system poor understand of the evaluation process and analysis this room would (it would be beneficial if time allowed) to give training in this process (it could be used to revise the instrument first thing).

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JOURNAL ENTRIES

WEEK OF 11/18

STEVEN JANS
74

ACTIONS TAKEN:

Verb Tic - Verbal intervention + reminder to c:> ...

BK - Washing hands + encouragement ...

Visit - Talked with ... about ...

Verb - Tic - answering + answering for adult [illegible] during Lunch ...

Mostly - Student Work Week - quick review of activities ... the "Steps Walk"

Initial Observation	Upon Reflection
Students were feeling the pressure of time left in the 12 weeks to finish their projects. It was decided to give students more lab work time	Students are getting tired of "school" at this time of the year. The application of the 7 C's is getting less. The result is the time used will wander (and the writings show this - students no longer in agreement) is the lab is taking time away from the "fun" aspects of the learning. Maybe the students aren't mature enough to be responsible when work, stolen and given the direction of the teacher even though the use the skills identified.

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JOURNAL ENTRIES

WEEK OF 11/26

STEVEN JANS

75

ACTIONS TAKEN:

"Test Co. Car Design" vs. end
End of 12 Weeks
MSLQ POST-TEST
P.M.I on 7 Sept.

Work Exp. - Kate & Jonathan

Initial Observation	Upon Reflection
Two-Ed and Student Test Co. car design is Race for time and assist competition	Develop a minimum amount of [illegible] - Two test with 1 pt. Comment The goal was analysis how to [illegible] constraints Take Teacher & the team initiate when test we were behind schedule the Necessities designers work for the class The Team was to measure fitted to Jonathan [illegible] and assistant would [illegible] and should [illegible] out of time. Team is after school to complete the assignment.

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End of 12 Weeks

JOURNAL ENTRIES

WEEK OF 12/

STEVEN JANS

76

ACTIONS TAKEN:

Initial Observation	Upon Reflection
	Students rotated into the next 12 week segment. Some take their work folders and journal entries are very poor.
	Due to this inconsistency there are large gaps in materials collected.
	I should have been checking as we progressed as alot of material was either not completed or "lost"

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INTRODUCTORY LESSON OF THE SEVEN INTELLIGENCES

Objective: Introduce students to the theory of Howard Gardner's Multiple Intelligences

Materials: Handout of the 7 intelligences

Focus: Students will become aware of Howard Gardner's 7 Intelligences and how they may use them to help students identify their own intelligences.

Activity:

1. Lecture / discussion of the seven intelligences
2. Read the handout (students silently, teacher aloud)
3. Discussion of each intelligence and how they may be favored or used by the individual students

Discussion:

1. What are the seven intelligences and what have I learned about them?
2. How might knowing the seven intelligences help you in your work at school?

materials taken from: Chapman, Carolyn, If the Shoe Fits, IRI Skylight Training and Publishing, Inc. (1993)

The Seven Intelligences

There were many candidates for "intelligences" that met his definition. However, after applying numerous criteria, only seven intelligences remained.

VERBAL/LINGUISTIC INTELLIGENCE

The verbal/linguistic intelligence is concerned with the uses of language. People with this intelligence possess a particularly strong sensitivity to the meanings of words and a skilled aptitude for their manipulation. According to Gardner, these people have "the capacity to follow rules of grammar, and, on carefully selected occasions, to violate them" (1983, p. 77). On yet another level—the sensory level—those with a heightened verbal/linguistic intelligence are able to communicate effectively by listening, speaking, reading, writing, and linking. They also have a strong awareness of the varying functions of language, or more specifically, its power to stimulate emotions. Poets, authors, reporters, speakers, attorneys, talk-show hosts, and politicians typically exhibit verbal/linguistic intelligence.

MUSICAL/RHYTHMIC INTELLIGENCE

As Gardner describes, "There are several roles that musically inclined individuals can assume, ranging from the avant-garde composer who attempts to create a new idiom, to the fledgling listener who is trying to make sense of nursery rhymes (or other 'primer level' music)" (1983, p. 104–105). Each of us holds musical capabilities to some degree, the difference is that some people have more skill than others. No matter what range of talent, we all possess a core of abilities necessary for enjoying a musical experience. These consist of the musical elements of pitch, rhythm, and timbre (the characteristic elements of a tone). People with a more highly developed musical/rhythmic intelligence are singers, composers, instrumentalists, conductors, and those who enjoy, understand, or appreciate music.

LOGICAL/MATHEMATICAL INTELLIGENCE

The logical/mathematical intelligence incorporates both mathematical and scientific abilities. Mathematicians are typically characterized by a love of working with abstraction and a desire for exploration. They enjoy working with problems that require a great deal of reasoning. A scientist, however, is "motivated by a desire to explain physical reality" (Gardner, 1983, p. 145). For scientists, mathematics serves as a tool "for building models and theories that can describe and eventually explain the operation of the world." Mathematicians, engineers, physicists, astronomers, computer programmers, and researchers demonstrate a high degree of logical/mathematical intelligence.

VISUAL/SPATIAL INTELLIGENCE

Visual/spatial intelligence involves the unique ability to comprehend the visual world accurately. Those with visual/spatial intelligence are able to represent spatial information graphically and have a keen gift for bringing forth and transforming mental images. Artists and designers have strong visual/spatial capabilities. They have a certain responsiveness to the visual/spatial world as well as a talent to recreate it to produce a work of art. Also among this group are sailors, engineers, surgeons, sculptors, cartographers, and architects.

BODILY/KINESTHETIC INTELLIGENCE

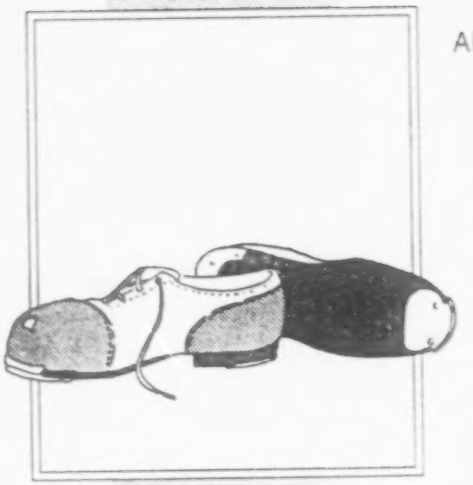
The bodily/kinesthetic intelligence is based on the gift of control of one's bodily motions and the talent to manipulate objects with deftness. It is possible for these elements to exist separately, however, most people possess both. In addition, people such as inventors and actors tend to have a great deal of bodily/kinesthetic intelligence because the role of their bodies is so critical to their occupations. Others with substantial bodily/kinesthetic intelligence include dancers, acrobats, and athletes.

INTRAPERSONAL INTELLIGENCE

The heart of intrapersonal intelligence lies in the ability to understand one's own feelings. These people instinctively comprehend their own range of emotions, can label them, and can draw on them as a means of directing their own behavior. In Gardner's words, "the intrapersonal intelligence amounts to little more than the capacity to distinguish a feeling of pleasure from one of pain, and on the basis of such discrimination, to become more involved in or to withdraw from a situation" (1983, p. 239). Examples of those with higher-than-average intrapersonal capabilities include the introspective novelist, wise elder, psychologist, or therapist—all of whom possess a deeper understanding of their feelings.

INTERPERSONAL INTELLIGENCE

Unlike intrapersonal intelligence, which is directed inward, interpersonal intelligence is one that focuses outward to individuals in the environment. The most basic skill among those with a high degree of interpersonal intelligence is the talent for understanding others. Those exhibiting this intelligence have the gift for noticing and making distinctions among other individuals, and more specifically among their "moods, temperaments, motivations, and intentions" (Gardner, 1983, p. 239). For example, at a very simple level, this intelligence includes the ability of a child to notice and be sensitive to the moods of adults around him. A more complex interpersonal skill is that of adults being able to read the intentions of others, even when hidden. People exhibiting this intelligence include religious and political leaders, parents, teachers, therapists, and counselors.



Verbal/Linguistic Intelligence

The tap shoe is the communicating shoe to represent the verbal/linguistic learner. The shoe makes the tapping sounds that tell us the message of the dancer. This symbolizes interpretation. When the dancer moves to the beat and taps out every sound, we interpret the full message.

What Is It?

The verbal/linguistic intelligence is the ability to use with clarity the core operations of language. The communicating of humans by reading, writing, listening, speaking, and linking are the significant components of this intelligence.

If the Shoe Fits... It Looks Like

Jeff, our communicating student, thinks well in words and expresses himself beautifully. He has a well-developed language ability, enjoys reading, writing, listening, and speaking, and is able to link new knowledge to prior experiences. Jeff fits well in today's classroom.

Wearing the Shoe in Life – Career Choices

- Author
- Talk-Show Host
- Teacher
- Speaker
- Politician
- Religious Leader
- Attorney
- Actor, Actress
- Salesperson

Musical/Rhythmic Intelligence

The drum major's boot is worn as the leader of the beat marches in front of the band. Counting the time with his baton, he keeps the band in rhythm as it plays a harmonious tune. He is aware of the sound and the beat; the beat-mind connection.

What Is It?

Musical/rhythmic intelligence is the ability to use the core set of musical elements—pitch, rhythm, and tone, and the acute awareness of sound in one's environment.

If the Shoe Fits... It Looks Like

Bonnie's highly developed intelligence is musical/rhythmic as she is immersed in sound and movement. She is tuned to the sounds and rhythms around her and responds by actions. Hers is a world of melody and beat.

Wearing the Shoe in Life - Career Choices

- Composer
- Conductor
- Disk Jockey
- Singer
- Instrumentalist
- Critic
- Sound Engineer
- Dancer
- Producer

Logical/Mathematical Intelligence

The hiking boot symbolizes the pattern seeker as represented by the laces. The problem-solving and critical-thinking hiker climbs step by step up the challenging path making decisions about direction and survival for food, clothing, and shelter. This is the tough shoe of the abstract thinker.

What Is It?

The logical/mathematical intelligence is the ability to use inductive and deductive reasoning, solve abstract problems, and understand complex relationships of mathematical reasoning and the scientific process.

If the Shoe Fits... It Looks Like

Roy has a highly developed logical/mathematical intelligence. This logical, abstract thinker enjoys calculations, problem solving, critical thinking, interpreting data, categorizing facts, and using technology. As he uses numbers, he is precise and accurate. He relies on the tools of the trade such as calculators and computers.

Wearing the Shoe in Life - Career Choices

• Engineer	• Physicist	• Computer Programmer
• Mathematician	• Inventor	• Astronomer
• Retail Buyer	• Banker	• Economist

Visual/Spatial Intelligence

Cinderella's glass slipper represents the world of imagination and creativity. The images reflected on the glass symbolize the images one sees behind one's eyelids. The way one sees the world in the "mind's eye" is that personal view of the world as pictured in one's mind.

What Is It?

The visual/spatial intelligence is the capacity to perceive the visual world accurately and to be able to recreate one's visual experiences. It involves the ability to see form, color, shape, and texture in the "mind's eye" and to transfer these to concrete representation in art form.

If the Shoe Fits... It Looks Like

Kay, our doodler, is visual/spatial. She is creative and sees her work in terms of pictures and colors. She invents in order to learn and will see complex visual and spatial relationships, abstract geometric patterns, and renderings of impressions of common objects.

Wearing the Shoe in Life - Career Choices

- Sculptor
- Engineer
- Painter
- Sailor
- Designer
- Architect
- Artist
- Graphic Designer
- Layout Editor

Bodily/Kinesthetic Intelligence

What shoe could possibly represent the bodily/kinesthetic learner better than the athletic shoe? The wearer is a picture of grace and skill in movement, using the body to express thoughts, actions, and emotions. Those wearing the sports-minded shoe are proactive learners—the doers.

What Is It?

The bodily/kinesthetic intelligence enables us to control and interpret body motions, to manipulate physical objects, and to establish harmony between the mind and the body.

If the Shoe Fits... It Looks Like

Joan tunes in to the world through touch and movement. She enjoys sports and physical movement, has a keen sense of direction, and a sense of timing when moving her body. She is full of energy and is a proactive learner.

Wearing the Shoe in Life - Career Choices

- Actor
- Coach
- Athlete
- Inventor
- Physical Therapist
- Martial Artist
- Acrobat
- Juggler
- Dancer

Intrapersonal Intelligence

The warm, comfortable bedroom slipper represents one's reflective time to learn about oneself in a quiet, cozy peaceful spot of one's own choosing. One who wears this shoe well enjoys time alone and feels peace to identify goals, strengths, and areas to improve.

What Is It?

Intrapersonal intelligence is the ability to form an accurate model of oneself, and to use that model to operate effectively in life. It is the ability to know oneself and assume responsibility for one's life and learning.

If the Shoe Fits... It Looks Like

Rose, our thinker, enjoys her own world of daydreams and yet astounds us with her insight and interpretation She needs time to reflect, think, and complete self-assessments that help her take control and be responsible for herself. She feels confident about herself.

Wearing the Shoe in Life - Career Choices

- Explorer
- Psychologist
- Inventor
- Researcher
- Philosopher
- Computer Expert
- Author
- Theologian
- Elite Athlete

Interpersonal Intelligence

The football cleats were chosen to represent the teaming of the interpersonal intelligence. Each member must do his or her part to make the team plays. Movements must be synchronized with the movement of every other player on the team. Working for and with others is one of the goals.

What Is It?

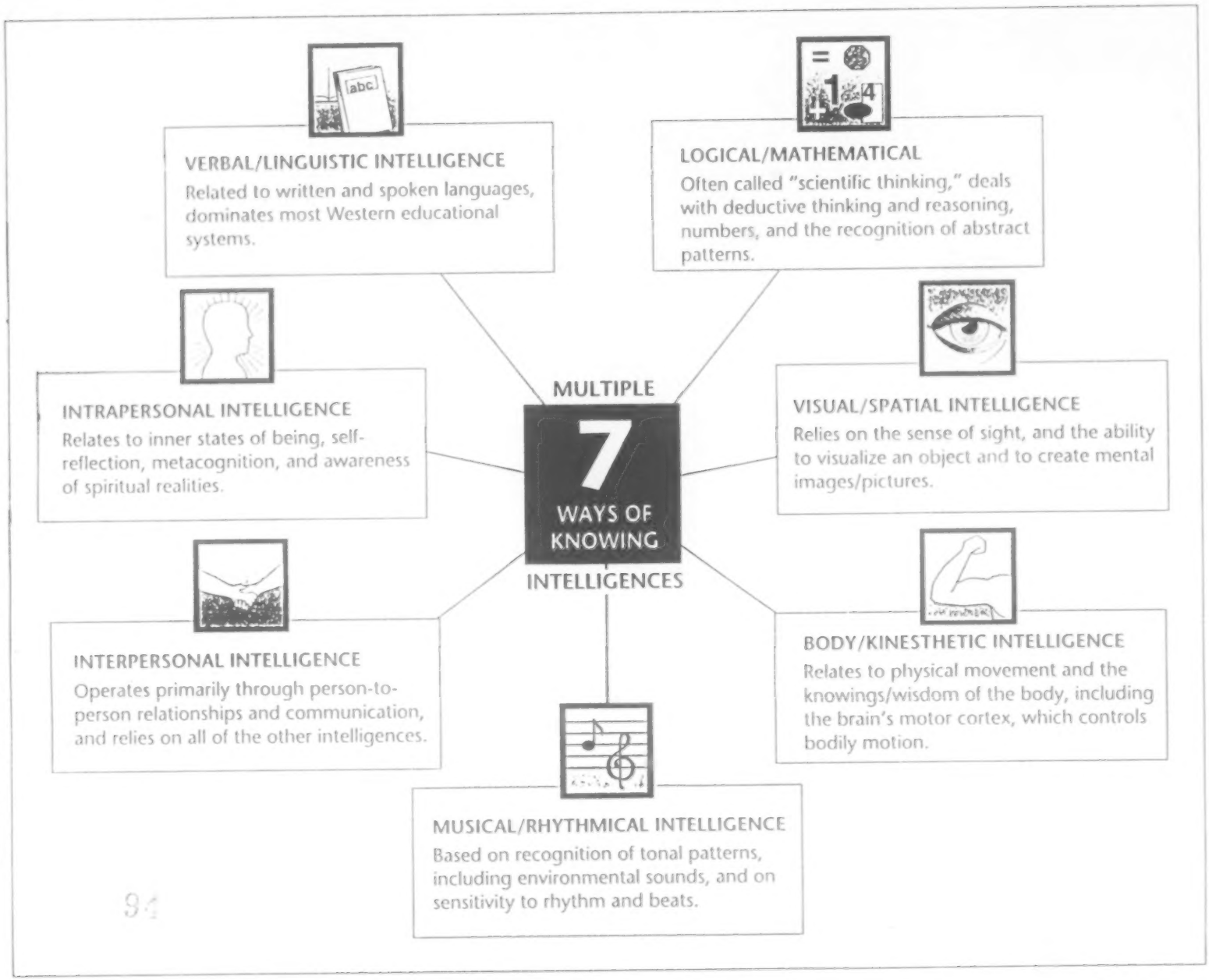
The interpersonal intelligence is the ability to get along with, interact with, work with, and motivate others toward a common goal. It involves the capacity to understand and interpret others' moods, temperaments, motivations, and intentions.

If the Shoe Fits... It Looks Like

Dave has a highly developed interpersonal intelligence, loving his fellow students and appreciating their diversities. He likes to study people in other cultures as well as their history and art. This social person is dependent for success on others and is a team player.

Wearing the Shoe in Life – Career Choices

- Counselor
- Doctor
- Pyschiatrist
- Religious Leader
- Teacher
- Salesperson
- Political Leader
- Nurse
- Social Worker


MULTIPLE
7
WAYS OF KNOWING
INTELLIGENCES
VERBAL/LINGUISTIC INTELLIGENCE
Related to written and spoken languages, dominates most Western educational systems.
LOGICAL/MATHEMATICAL
Often called "scientific thinking," deals with deductive thinking and reasoning, numbers, and the recognition of abstract patterns.
INTRAPERSONAL INTELLIGENCE
Relates to inner states of being, self-reflection, metacognition, and awareness of spiritual realities.
VISUAL/SPATIAL INTELLIGENCE
Relies on the sense of sight, and the ability to visualize an object and to create mental images/pictures.
INTERPERSONAL INTELLIGENCE
Operates primarily through person-to-person relationships and communication, and relies on all of the other intelligences.
BODY/KINESTHETIC INTELLIGENCE
Relates to physical movement and the knowings/wisdom of the body, including the brain's motor cortex, which controls bodily motion.
MUSICAL/RHYTHMICAL INTELLIGENCE
Based on recognition of tonal patterns, including environmental sounds, and on sensitivity to rhythm and beats.

materials taken from: Costa, A., & Bellanca, J., & Fogarty, R., If Minds Matter, VolII, Designs for Change, IRI. Skylight Pub.(1992).

APPENDIX G (1 of 9)

INTERPERSONAL INTELLIGENCE

Introductory lesson for the Intrapersonal Intelligence

Targeted Intelligence: Interpersonal

Supporting Intelligence: Intrapersonal, Visual / Spatial

Materials: Index cards with roles

Task Focus: Groups of four will use cards and the round robin to coach each other in learning the basic group roles.

Product: Job role card

Problem: How to learn cooperative roles and responsibilities

Activity:

1. Give each student an index card with a role title and responsibilities written on it.
2. Once the students are seated, each will read his or her card to the new group.

   Encourager: You are the cheerleader. No put-downs allowed.

   Checker: You make sure everyone agrees and can explain his or her job.

   Recorder: You record your team's work on paper for presentation by the reporter.

   Reporter: You present you team's work to the class.

Discussion:

1. What is the responsibility of each job?
2. How do you think doing those jobs will help with cooperation?
3. What will be the effect on your group if a member doesn't complete their task?

adapted from: Chapman, Carolyn, If the Shoe Fits. IRI Skylight Training and Publishing, Inc. (1993)

APPENDIX G (2 of 9)

LOGICAL / MATHEMATICAL

Introductory lesson for the Logical / Mathematical Intelligence

Targeted Intelligence: Logical / Mathematical

Supporting Intelligence: Visual / Spatial, Intrapersonal, Interpersonal

Materials: ten washers, a blank overhead transparency for each pair of students

Task Focus: These activities are designed to stretch the mind and facilitate problem solving.

Product: Problem-solving technique

Problem: How to solve a washer puzzle problem

Activity I :

1. Pair students.
2. Each pair gets ten washers or circles of the same size.
3. Place the washers in the following design on the overhead projects

4. Tell students that they must try to move one washer at a time in only three moves to end up with this shape.

5. Allow time for students to solve the puzzle.

Activity II:

1. Each student needs six washers that are the same size.
2. Show this arrangement on the overhead.

O O O O
O
O

3. Now arrange the washers so that each row has three washers, using all six washers.
4. Allow solving time, and then show the trick.

Discussion:

1. What were the steps in your thinking as you solved the problems?
2. How well did you follow directions?
3. How did you know you were on the right track?
4. Does drawing the problem seem to help you or did you just do it and evaluate it later?

adapted from: Chapman, Carolyn, If the Shoe Fits. IRI Skylight Training and Publishing, Inc. (1993)

VISUAL / SPATIAL INTELLIGENCE

Introductory lesson for the Visual / Spatial Intelligence

Targeted Intelligence: Visual / Spatial

Supporting Intelligence: body / kinesthetic

Materials: pencil, paper

Task Focus: Students will use visualization skills to create a mental image and draw the front of their house. Students will use graphic organizers to present and remember important information about their house.

Product: drawing and web

Problem: visualize and draw the front of your house

Activity:

1. Students will close their eyes and pretend in their mind's eye that they are a hummingbird hovering over the sidewalk in front of their house or apartment.
2. Students will visualize a picture of what their house looks like from the birds viewpoint.
3. Students will complete a web of the major parts of the house.
4. Students will draw the front of their house or apartment.

Discussion:

1. How did mental images of your house help you to complete the drawing?
2. Did the graphic organizer help you remember important information?
3. What subjects use visualization skills to teach or help you organize information? (example: web, T-chart, pictures, charts)

APPENDIX G (5 of 9)

VERBAL / LINGUISTIC INTELLIGENCE
Introductory lesson for Verbal / Linguistic Intelligence

Targeted Intelligence: Verbal / Linguistic

Supporting Intelligence: Interpersonal

Materials: Paper and pencil

Task Focus: The activity shows correct listening habits and what a person needs to do verbally and nonverbally to be a proactive learner.

Product: T-charts of listening and non listening behaviors

Problem: What happens when people don't listen

Activity:

1. Divide students into pairs. Name one A and the other B.
2. Student A Thinks of an interesting story that B would like to hear. Student B is instructed to show "proactive listening" with his or her verbal and nonverbal listening habits.
3. A tells the story; B listens intently. Stop after 1 to 2 minuets.
4. Give feedback and describe the "listening behaviors" you noticed.
5. A can continue that story or think of a new one. B is to do everything in his or her power not to listen except leave the room. A must keep telling the story no matter what.
6. A tells the story and B doesn't listen for 1 to 3 minutes.
7. When A can't stand it any longer, stop the activity and give feedback of what was observed.
8. Ask A for a comparison and B for feedback.
9. In groups of 4, make T-charts on listening and non listening behaviors.

Discussion:

1. What are the attributes of a good listener?
2. Why is it important to be a good listener?
3. How might you improve your listening behavior?

adapted from: Chapman, Carolyn, <u>If the Shoe Fits.</u> IRI Skylight Training and Publishing, Inc. (1993)

APPENDIX G (6 of 9)

INTRAPERSONAL INTELLIGENCE

Introductory lesson for the Intrapersonal Intelligence

Targeted Intelligence: Intrapersonal

Supporting Intelligence: Visual/Spatial, Verbal/Linguistic

Materials: Large piece of paper, markers or crayons

Task Focus: Each student will design a T-shirt reflecting his or her likes, favorite book characters, goals, or strengths.

Product: T-shirt

Problem: How to accept positive feedback

Activity:

1. Have each student cut or tear the shape of a large T-shirt out of paper.
2. Give the following directions:

   a. Put your name in the center of the T-shirt in graffiti style.
   b. On one sleeve, draw two things you like to do in your spare time.
   c. On the other sleeve, draw ways that you learn best.
   d. In one of the bottom corners, draw what or who you what to be ten years from now.
   e. In the bottom of the other corner, draw and write about a goal you set for yourself next year.
   f. Under your name, write an adjective that describes the way you want others to describe you.
   g. Include a symbol of your favorite character from a book.
   h. Design the rest of your t-shirt with your favorite sketches, doodles, and colors.
   i. Show your T-shirt to the students around you.

Discussion:

How did you feel when friends around you gave you positive words?

adapted from: Chapman, Carolyn, If the Shoe Fits. IRI Skylight Training and Publishing, Inc. (1993)

INTRAPERSONAL INTELLIGENCE

"GOLDEN RULE"

Targeted Intelligence: Intrapersonal

Supporting Intelligence: Interpersonal

Materials: paper, markers, PMI sheet

Task Focus: self awareness, concern for others

Product: web and PMI

Problem: Students making put downs to other students

Activity:

1. Teams with 2 students.
2. Web and generate a list of put downs. (3 minutes)
3. Web and generate a list of put-ups . (3 minutes)
4. Compare size of lists of put-downs and put-ups.
5. Complete the PMI

Discussion:

1. What does it say about our class that we know more put-downs than put-ups?
2. How does it make you feel when you put another students down? How does the other student feel?
3. How do you feel when you're put down?
4. How do you feel when you give another student a put-up?
5. Remember the "Golden Rule"?

BODY/ KINESTHETIC

Introductory lesson for the Body / Kinesthetic Intelligence

Targeted Intelligence: Body / kinesthetic

Supporting Intelligence: Musical/Rhythmic, Logical / Mathematical

Task Focus: Students will be asked to use body movement as a memory aide

Problem: To learn definitions through movement

Activity I :

1. Tell students what a molecule is and what happens in its different forms (solid, liquid, gas).
2. To help them remember, assemble the entire class in a circle with tightly locked arms. Instruct them to move together-very slowly. Ask them to identify the molecular state (solid)
3. Have the groups spread out. Let them hold hands at arm's length. Instruct them to sway and swing. Identify the state (liquid)
4. Have each person stand alone. Instruct them to move freely. Identify the state (gas).
5. When all of the students sit down, check for the definitions.

Activity II :

1. Remind students of the divisions of an inch and their length of their lines on a ruler.
2. In a rhythmic tone, have student repeat the words; halves, quarters, eighths, sixteenths.
3. Have students stand.
4. Have students stand a full height and squat a short distance as they say "halves"; squat lower and say "quarters"; and so on for "eighths" and "sixteenths". repeat.

Discussion: How did movement help you learn to remember the terms?

adapted from: Chapman, Carolyn, <u>If the Shoe Fits.</u> IRI Skylight Training and Publishing, Inc. (1993)

APPENDIX G (9 of 9)

MUSICAL / RHYTHMIC INTELLIGENCE

Introductory lesson for the Musical / Rhythmic Intelligence

Targeted Intelligence: Musical / Rhythmic

Supporting Intelligence: Verbal / Linguistic , Intrapersonal

Materials: overhead projector

Task Focus: Students will identify ways music is used as a relaxation device, emotion setting device, and memory enhancer.

Product: Students will generate a list of how music is used to help learn, remember, and relax.

Activity I :

1. What is musical / rhythmic intelligence?
2. Students will work in teams of 4 to 5.
3. Assign Recorder and Reporter
4. List different emotions elicited by various music. (example: relaxation, anger, happiness, etc.) (Kenny G and Marilyn Manson)
5. Round robin examples, put on overhead projector

Activity II :

1. Assign different Recorder and Reporter
2. Define Mnemonics (examples: a,b,c,d,e,f,g... song, with musical rhythmic tune)
3. Students generate list of mnemonics they have or could use
4. Round robin examples, put on overhead projector

Discussion:

1. How do the variations in music effect memory, emotions, and moods?
2. Does the use of mnemonics help you remember?
3. Could you develop your own mnemonics?

Name_____
Period_____

WOODWORKING PROJECT
SELF EVALUATION

HOW WELL DID YOU DO:	EXCELLENT	GOOD	FAIR	
1) **SQUARING YOUR BOARD:**(jointing, ripping, crosscutting) are your edges and ends straight, smooth, square, and parallel?	3	2	1	0
2) **DRILLING YOUR BOARDS:** Are your holes round, chipped, egg shaped, accurately located?	3	2	1	0
3) **GLUING YOUR WORK:** Are your glue joints tight without excess glue on your work? Is it neat?	3	2	1	0
4) **MEASURING YOUR WORK:** Is your work the size specified in your plans?	3	2	1	0
5) **ROUTING YOUR WORK:** Are your routed edges smooth, uniform, without burns or chipping?	3	2	1	0
6) **SANDING YOUR WORK:** Was all sanding done with the grain? No scratches, pen, pencil, or mill marks.	3	2	1	0
7) **STAINING YOUR WORK:** Is the stain applied uniformly without excess stain, streaks, smudges, fingerprints?	3	2	1	0
8) **FINISHING YOUR WORK:** Was your finish applied in a uniformly smooth, streak free, bubble free, and dust free manner?	3	2	1	0
9) **YOUR WORK:** Did you do all the work on the project, had some help, had alot of help, watched it being done?	3	2	1	0

SCORE _____

27-23=A
22-19=B
18-15=C
14-8=D

THE CO POWERED DRAGSTER
GRADE YOUR CAR

How well did you do in designing your car?

1) Did you follow the design process? thumbnails, rough sketches, final drawings	3	2	1	0
2) Did you use aerodynamic principals in your design?	3	2	1	0
3) Did you strive to reduce as much weight as possible? (weight/thrust ratio)	3	2	1	0
4) Is your design unique? (is it yours?)	3	2	1	0

How well did you do in constructing your car?

1) Did you use the final drawing to transer your design to the wood?	3	2	1	0
2) Did you accurately cut your design from the wood?	3	2	1	0
3) Did you do a good job in sanding your car? (no sanding scratchs, cuts, etc.)	3	2	1	0
4) Did you do a good job painting your car? (no drip, runs, scratches, smooth, etc.)	3	2	1	0
		+	+	+

NAME_____Per._____ SCORE_____

THE CO POWERED DRAGSTER
GRADE YOUR CAR

How well did you do in designing your car?

1) Did you follow the design process? thumbnails, rough sketches, final drawings	3	2	1	0
2) Did you use aerodynamic principals in your design?	3	2	1	0
3) Did you strive to reduce as much weight as possible? (weight/thrust ratio)	3	2	1	0
4) Is your design unique? (is it yours?)	3	2	1	0

How well did you do in constructing your car?

1) Did you use the final drawing to transer your design to the wood?	3	2	1	0
2) Did you accurately cut your design from the wood?	3	2	1	0
3) Did you do a good job in sanding your car? (no sanding scratchs, cuts, etc.)	3	2	1	0
4) Did you do a good job painting your car? (no drip, runs, scratches, smooth, etc.)	3	2	1	0
		+	+	+

NAME_____Per. 106 SCORE_____